SUMMARY REPORT

GREATER TORONTO AREA URBAN STRUCTURE CONCEPTS STUDY

Prepared for
The Greater Toronto Coordinating Committee

JUNE, 1990

IBI GROUP

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URBAN STRUCTURE CONCEPTS STUDY

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The Greater Toronto Coordinating Committee

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June 8, 1990

Mr. E. M. Fleming
Chairman
Greater Toronto Coordinating Committee
5 Park Home Avenue
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Dear Mr. Fleming:

Greater Toronto Area Urban Structure Concepts Study: Summary Report

This report summarizes the results of the Greater Toronto Area Urban Structure Study. Owing to the complexity of the study and the number of components involved, a series of eight background reports has also been defined, as follows:

1. Description of Urban Structure Concepts;
2. Minimal Growth Option;
3. Transportation Systems;
4. Water, Sewers and Solid Waste;
5. Greening/Environment;
6. Human Services;
7. Comparison of Urban Structure Concepts;
8. Public Attitudes Survey (to follow in Fall, 1990).

The first seven background reports are also dated June 8, 1990 and the eighth will follow, as indicated.

This Summary Report draws on more detailed material in the background reports and presents highlights of the study and its findings.

The report describes the development of three generic urban structure concepts for the Greater Toronto Area (GTA), illustrating different ways the area might develop over the next 30 years, and compares the concepts in terms of infrastructure requirements and costs, and a number of other important criteria relating to urban function and the quality of life anticipated under the various concepts.

After a brief introduction in Chapter 1, Chapter 2 describes the three urban structure concepts and the basis on which they were developed. Chapter 3 presents the comparison approach and results, and Chapter 4 provides an interpretative discussion of the results.

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In keeping with the study terms of reference, we do not provide a "bottom line" evaluation which states that one urban structure concept is "better" than another in overall terms. Rather, the three concepts are compared in terms of each of a number of criteria, factors and measures, using quantitative and/or qualitative measures as appropriate. The team has attempted to present these comparisons objectively and systematically, so that the reader can draw his or her own conclusions based on the data and opinions presented.

The interpretative comments in Chapter 4 are provided to highlight differences among the three urban structure concepts, to discuss the infrastructure cost implications of providing higher or lower levels of service, and to comment on possible next steps following this strategic assessment of three generic concepts.

This study breaks new ground by drawing together demand, supply, cost and effectiveness findings for three quite different future urban forms for the entire GTA including both "hard" and "soft" infrastructure. There is, therefore, little precedent against which to assess the results, some of which are perhaps unexpected or at least thought-provoking. The results are therefore preliminary, for discussion. If, as the findings are scrutinized and the comparison ratings are discussed, a consensus emerges regarding a preferred future urban structure for the GTA and/or a process for moving purposefully in that direction, the study will have served its purpose.

The opinions offered herein are those of the consultant and reflect to the extent possible comments received from the Urban Structure Subcommittee established for this study. They do not necessarily reflect the views of the Greater Toronto Coordinating Committee or the governments represented on the Committee.

We trust that the comparison results will be useful as decisions are made regarding future steps to plan and achieve ongoing development of the GTA which maintains and, where possible, enhances the quality of this great metropolis while accommodating its continuing growth in a cost-effective manner.

Yours sincerely,

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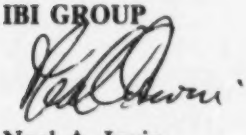

Neal A. Irwin
Managing Director

NAI:mr

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Greater Toronto Area Urban Structure Concepts Study: Summary Report: Executive Summary

EXECUTIVE SUMMARY

BACKGROUND

The general objective of the GTA Urban Structure Concepts study is to develop three generic urban structure concepts for the GTA and provide a broad, strategic comparison of the three concepts in terms of their infrastructure requirements, the capital costs of such facilities, and a number of other important criteria. The latter include environmental quality, energy consumption, economic impetus, and the ability to achieve sustainable development, help conserve the regional and global environment, and maintain or improve the quality of life for those living and working in the GTA and areas surrounding it.

The three urban structure concepts which have been developed for this purpose are described more fully in Background Report No. 1: Description of Urban Structure Concepts. Their main characteristics are as follows:

1. a status quo concept, representing a continuation of existing trends, characterized by substantial population growth in the suburban regions at relatively low density, with continuing concentration of office development downtown and in various subcentres in Metro and the four adjacent regions (designated as **Concept 1, Spread**);

2. a concept in which substantial additional population growth/ intensification occurs within the central, built-up parts of the GTA along with further intensification of commercial growth, such that the rate of urbanization occurring beyond the existing urban boundaries would be significantly reduced (referred to as **Concept 2, Central**); and

3. an intermediate concept in which the broad distribution of people and jobs is more similar to that of Concept 1 than of Concept 3, but in which growth occurs primarily in and around existing communities in a compact form, resulting in a reduction in the rate of consumption of undeveloped land relative to Concept 1 (designated as **Concept 3, Nodal**).

OBJECTIVES AND SCOPE OF THIS REPORT

The objective of this report is to summarize the study findings and provide a systematic comparison of the three urban structure concepts in terms of the following:

- transportation;
- hard services (water, sewer, solid waste management);
- greening/environment;
- human services.

INFRASTRUCTURE REQUIREMENTS

Infrastructure system concepts were developed, as appropriate, for each of the three urban structure concepts and capital cost estimates were prepared for each, along with quantitative or qualitative assessments of operating costs, focusing in particular on differences among the three concepts.

The study horizon year is 2021: capital costs are estimated on a cumulative basis for the period 1990-2021 (in 1990 dollars), with interim estimates for the period 1990-2011. Cost estimates are based on use of existing technology for relevant infrastructure and services in most instances. Where this is not the case, or where policy or standards changes are assumed, these are identified. During the 31 year period the GTA is anticipated to grow to 6.0 million people and 3.4 million jobs under all three urban structure concepts, a population growth of about 50% relative to 1990 levels.

OTHER BASIC ISSUES

A number of important issues are also addressed in the comparison, to augment the above infrastructure/cost comparison, including the following:

- urban structure;
- economic impetus;
- environmental quality;
- energy consumption;
- external impacts;
- other quality of life factors.

The comparison was conducted at a broad, strategic level.

The comparison methodology is described in the body of the report. General conclusions based on the results are summarized in this Executive Summary and more detailed comparison results and comments are presented in the report and in Background Report No. 7.

CONCLUSIONS: CONCEPT COMPARISONS

Based on the foregoing, the general conclusions stemming from the concept comparisons are as follows:

- **capital costs** for all three concepts are large, about $74-$79 billion in 1990 dollars, cumulative over the 31 year period 1990-2021, involving a 42% increase in average annual expenditures over recent annual investment levels. On a per capita basis, average annual expenditures would increase by only about 7%, reflecting the larger future population. While the capital cost ranges for Concepts 2 and 3 are slightly lower than the estimate for Concept 1, differences among the three concepts are insignificant relative to the uncertainty range of the estimates. All three concepts are therefore rated equally in terms of this measure;

- **operating costs** for solid waste disposal are similar across all three concepts, but there are more significant differences in transportation operating costs, with Concept 1, Spread, having the highest annual transportation operating costs in 2021 ($12.0 billion), Concept 2, Central having the lowest ($9.9 billion) and Concept 3, Nodal having intermediate costs ($11.1 billion) under this measure. Again, all cost estimates are in 1990 dollars. Most other operating costs were treated qualitatively owing to study scope and time limitations. Concept 2 is therefore rated highest and Concept 1 lowest under this measure;

- **urban structure**: Concept 3, Nodal, generally receives higher ratings, followed by Concept 2, Central and then by Concept 1, Spread. Concept 2 would consume significantly less rural land for urbanization but Concept 3, Nodal, is seen as superior in terms of having less growth impact on existing community character, providing a wider range of community sizes, and providing a broader range of community diversity in housing types/ownership, densities and mix of residential and job activity;

- **economic impetus**: Concept 2, Central, would have the lowest impact on agriculture, forest products and mineral resource activities in the GTA and would have the lowest cost push impact on land development costs, but could have a higher risk of a land supply/demand imbalance which could lead to price increases for land, housing and employment facilities, depending on the manner in which

the required growth management is carried out if this concept were adopted;

- **transportation**: Concept 2, Central, generally receives higher ratings because of shorter trips, greater transit use and generally lower transportation effort, followed rather closely by Concept 3, Nodal in terms of similar measures. Concept 1, Spread, would be superior in terms of the road network extent and level of service in the suburbs and in terms of intercity connections and access to rural areas, but would have substantially higher levels of transportation effort (e.g. average trip distance) and operating costs, and a greater possibility of road congestion in central areas because of the practical difficulty of building the necessary roads in build-up areas;

- **hard services**: all three concepts are essentially equal in terms of trunk water and sanitary sewerage systems and solid waste management costs, reflecting the postulated numbers and distributions of people and jobs. Concept 2, Central, rates highest in terms of its low land development/redevelopment/local servicing costs, with Concept 1, Spread having the lowest rating (highest cost) and Concept 3, Nodal, having an intermediate rating closer to that of Concept 2 than Concept 1;

- **greening/environment**: Concept 2, Central, generally has higher ratings under the measures of this criterion, followed fairly closely by Concept 3, Nodal. An exception to this is the high rating of Concept 1, Spread, in terms of its having the lowest need (and cost) to acquire new passive open space in the urbanized area, whereas Concept 2 would have a substantially higher cost in this regard, followed by a slightly lower cost for Concept 3, if the attempt were made to achieve equal levels of passive open space within the urbanized area under each concept. On the other hand, all three concepts would have the same cost for passive open space if the 2,200 acres of new passive open space needed for Concept 1 to maintain existing standards were acquired also for Concepts 2 and 3 within the same overall area (the urbanized area for Concept 1). However, under this approach residents of Concept 2 and, to a lesser extent, Concept 3 would have to travel farther, on average, to experience the new open space than would residents of Concept 1, since the new space would be largely in the suburbs. Both approaches are shown for the comparison

under this measure and both produce the same relative comparison ratings; however, they produce different capital cost estimates which account for the cost ranges shown for Concepts 2 and 3 in terms of passive open space and greening/environment;

- **human services**: Concept 3, Nodal, has generally higher ratings under this criterion, followed by Concept 2, Central under most of the five relevant measures. An exception is the cultural/recreation measure, in which Concept 1, Spread, is rated as high as Concept 3, Nodal because of its relatively low capital cost for urban parks, while Concept 2, Central, is rated lowest in this regard because of the higher requirement and cost for urban parks to serve the higher central population densities under that concept;

- **external impacts**: Concept 3, Nodal, generally receives higher ratings under this criterion since, in common with Concept 2, it is anticipated to create less pressure for GTA overspill (low density) development in the rural hinterland adjacent to the GTA and this, coupled with its higher level of transit service and use in suburban areas, is likely to create less pressure for GTA oriented road traffic in the hinterland. There may be increasing pressure under all concepts for rural development in the adjacent hinterland for "country retreats"; this could be more pronounced in Concept 2 because of its higher urban density, but it is difficult to differentiate in this regard based on the information available.

CONCLUSIONS: QUALITY/COST TRADE-OFFS

Earlier sections have noted that the substantial capital cost investments required for all three urban structure concepts relate to the level of service (quality standards) assumed in these analyses. Generally, the analyses were based on the assumption that sufficient infrastructure should be provided to achieve a **similar level of service** to that experienced in 1986 in the GTA, as the **"basic"** level of service. In addition, in one or two instances, cost estimates were provided (and included) for infrastructure investments to **improve** the level of service provided.

There are four subcomponents of the infrastructure capital cost estimates which are significant in this regard, two of them falling under the transportation criterion and two under the greening/ environment criterion, as follows:

- **transit**: substantial investment levels are estimated for improved transit under all three concepts, particularly Concept 2, Central with an estimate of $14.4 billion. This level of investment (about $460 million per year on average) would be essential in the view of the study team in order to serve the Central Concept and provide an acceptable alternative to the automobile mode, and approximately half that level of investment (about $230 million per year) would be required for improved transit even under the Spread Concept with its emphasis on an extended and improved road network;

- **roads**: the extensive capital investments estimated for new/improved roads ($19.9 billion for Concept 1, $17.0 billion for Concept 3, and $13.2 billion for Concept 2) are based on the premise that the road network would be expanded to the extent that equal levels of service would be provided under all three concepts. The cost estimates were based on the assumption that sufficient new lane-km of roads would be added to provide peak period travel speeds similar to those experienced in 1986 throughout the GTA. This subcomponent is the largest single contributor to the estimated capital costs, comprising about 25% of the estimated total. It is possible that such a level of investment and the impact of such roads in the central area would be considered too high and the alternative of increased road congestion in central and/or suburban areas would be tolerated instead. If this were the case, Concept 2, Central, would experience the least negative impact from such a shortfall while Concept 1, Spread, would have the greatest negative impact and the impact on Concept 3, Nodal, would be intermediate. Alternatively, more transit investments in the central, built-up areas might be made under Concepts 1 and 3 to make up for the road shortfall, incurring similar levels of capital cost to those shown above;

- **passive open space**: the initial assumption under this measure was that sufficient passive open space would be purchased **within** the urbanized area under each concept to meet the current standard of 1.8 ha per 1,000 people. It is probable that the significant cost and physical dedication of large land areas to passive open space use in existing urbanized areas ($6.0 billion under Concept 2, $4.7 billion under Concept 3 and $1.1 billion under Concept 1) would be considered to be too high for Concepts 2 and 3, such

that lower passive open space standards would be accepted for these concepts. This could be achieved, for example, by providing the necessary passive open space in **the same area** (e.g. the urbanized area of Concept 1) for all three concepts. Under this assumption all three concepts would have the same capital cost for passive open space ($1.1 billion) but residents in Concept 2 (and to a lesser extent Concept 3) would have to travel farther, on average, than would suburban residents in Concept 1, to experience the new passive open space, most of which would likely be located in suburban areas.

- **storm water quality**: as described more fully in Background Report No. 5, measures are currently in place to improve the quality of storm water runoff in new suburban areas through measures such as settling ponds. Partial treatment of retained storm water by water pollution treatment plants during off-peak periods is a future possibility. Polluted storm water runoff, sometimes mixed with sanitary sewage because sanitary/storm sewer separation has not been completed, still remains a major problem, however, and severely degrades the quality of GTA river valleys and lakefront amenities. The existing urbanized areas, and particularly the central areas, are increasingly the major problem in this regard. It would be possible to spend very large sums to address this problem but it is difficult to estimate their magnitude and, accordingly, we applied a general estimate of about $2 billion to all three concepts. Concept 2, Central, would probably provide the greatest opportunity to reduce storm water runoff pollution because retention/treatment facilities could be installed more economically as part of the extensive redevelopment which would occur in central areas under that concept. If it were decided that this level of expenditure could not be maintained to improve the quality of storm water runoff, the greatest loss of opportunity would be experienced under Concept 2, followed in turn by Concept 3 and then Concept 1, but the beaches and river valleys would experience continuing negative impacts under all three concepts.

Clearly, trade-off decisions between levels of capital investments and the resulting functional/environmental standards achieved will require broad input from elected officials, staff, interest groups and the public at large. Increasing concerns regarding environmental quality and required actions to achieve sustainable development in this context

will undoubtedly play an important role in this process. The strategic estimates presented here, and the discussion of some basic trade-offs, are intended to facilitate this discussion and consequent decisions.

SUMMARY: CONCEPT TRADE-OFFS

Emerging from the above ratings and the quantitative projections on which they are based are a number of essential features about each of the three concepts, as follows:

- **Concept 1, Spread:**

  - this concept is the least compatible with sustainable development in that it would consume the greatest amount of rural land and related agricultural productivity and natural resources, would use the most energy and produce the most air pollution because of its higher travel effort and greater reliance on automobiles, and would provide less opportunity to enhance storm-water quality and dispose of toxic soils in central, built-up areas than would be the case for Concept 2 and, to a lesser extent, Concept 3;

  - Concept 1 is, however, closest to the status quo in terms of delivery of new housing, lifestyles, and government planning/regulation affecting urban development.

  In some ways, therefore, Concept 1 is the least risky, since it would require less change from the status quo. In the longer term, however, it carries the highest risk since it would place greater negative pressures on the environment and on natural resources including energy sources and agricultural land. The environmental risk relates strongly to recent evidence that transportation activities, and particularly automotive transportation emissions, are contributing significantly to acid precipitation, global warming, ozone depletion at high levels, and local toxic effects in and around urban areas.

- **Concept 2, Central:**

  - this concept makes the most efficient use of resources (e.g. land, energy) and places the least negative load on the environment;

  - however, it would require the greatest amount of government regulation in order to divert

population growth from suburban areas to central, built-up areas.

It would require the greatest change from the status quo in terms of population densities and housing types, less automotive travel and greater use of transit, and growth management policies/programs, with the risks that are inherent in any significant change from the status quo. On the other hand, it would provide the greatest likelihood of achieving sustainable development and avoiding, in the longer term, the apparently inexorable growth of suburban automobile traffic as it is increasingly experienced in large North American cities;

- **Concept 3, Nodal:**

  - this concept builds on existing communities and their urban infrastructure such as civic buildings, commuter rail stations, transportation and other local infrastructure, while providing for continuing growth both in the suburbs and in the central, built-up areas but at higher densities of suburban development than under Concept 1;

  - it would appear to provide the greatest range of choice in terms of population densities and housing types, community size and character, suburban and downtown living styles, available range of transportation modes, and integrated delivery of human services, while reducing per capita resource requirements and pollution levels relative to Concept 1.

  Generally, it would be intermediate between Concepts 1 and 2 regarding its compatibility with sustainable development, the required level of government regulation and other comparison measures, with high rankings in terms of urban amenities, human services and external impacts on the GTA hinterland.

- **Costs:**

  - although minor capital cost savings might be achieved with Concept 2 and, to a lesser extent, Concept 3 relative to Concept 1 (if lower accessibility standards to passive open space were accepted under these concepts) the differences are not significant relative to the overall size of the

capital investment for any of the three concepts and the range of uncertainty in the estimates;

- transportation operating costs would be significantly less for Concept 2 than Concept 1 (about $2 billion per year difference) and Concept 3 would have an intermediate level.

In terms of capital costs, therefore, the similarity suggests that choices among the concepts (or hybrid versions of them) will focus more on the functional and qualitative aspects of the concepts than on their capital costs.

AN INFORMED DEBATE

An informed debate on the most appropriate future urban structure for the Greater Toronto Area will focus, therefore, on the relative importance to the people and leaders of the metropolis of basic urban objectives:

- an efficient, pleasant and diverse urban ambience;
- continuing opportunities for and encouragement of economic growth;
- efficient, reliable, convenient and environmentally-benign transportation;
- cost-effective hard services;
- preservation and enjoyment of green areas and related water resources and achievement of sustainable development such that environmental quality is maintained or enhanced and natural resources conserved;
- effectiveness/efficiency of human services; and
- positive rather than negative impacts on the adjacent hinterland.

Debate regarding the relative importance of, and trade-offs among, the above types of objectives, in the context of information provided by this preliminary study, will, it is hoped, provide a sound basis for decisions on future directions for the GTA.

Greater Toronto Area Urban Structure Concepts Study: Summary Report

1. INTRODUCTION

1.1 BACKGROUND

As documented in the Terms of Reference and elsewhere, the Greater Toronto Area (GTA), comprising the Municipality of Metropolitan Toronto and the Regional Municipalities of Durham, Halton, Peel and York, is at a critical point in its development:

- most of the land within Metro Toronto has been developed; population growth has therefore slowed but rapid employment growth continues and there are significant options for further population growth through intensification and development/redevelopment of a number of major sites;

- rapid urbanization is occurring in the four Regional Municipalities; major issues include the structure and density of development and the balance/mix of population and employment, which greatly affect infrastructure requirements;

- in the GTA as a whole, rapid growth in the number of people and jobs, compounded by unprecedented increases in per capita demand for transportation, hard (water and sewer) services, waste disposal, housing, health, education, social services and recreation, have placed great strains on the infrastructure required to provide these services;

- continuing rapid growth is forecast for the GTA and, while rates of per capita increases in demand for urban services may taper off to some extent (e.g. with saturation of the rate of entry by women into the labour force and a correspondingly reduced rate of employment growth relative to population, increasingly due to the aging of the population), massive infrastructure investments will be required to address supply-demand deficits which accumulated during the 1970s and 1980s, along with the requirements of an additional one and one-half to two million people expected in the GTA 20-30 years from now;

- important decisions on the density, structure and mix of land uses and the types and locations of infrastructure will be required in order to maintain and enhance, if possible, the quality of life (in terms of measures such as housing and urban amenities, economic opportunities, transportation, water supply and sewage/waste disposal, preservation/ enjoyment of green areas, quality of the urban and rural environment, and availability of human services) now enjoyed by inhabitants of the GTA;

- coordinated long range planning and a means for the overall management of growth and implementation of infrastructure is required which, while relatively easy in earlier decades when most of the growth was occurring in Metro Toronto, is now more complex because of the involvement of five regional governments, 30 local municipalities, and a large number of boards and commissions. The provincial government, through the Greater Toronto Coordinating Committee (GTCC) in cooperation with the relevant ministries, has been working with representatives of the regional and local municipalities to set up a workable process which will provide this coordinated approach.

1.2 STUDY PURPOSE AND SCOPE

The purpose of this study is to develop three generic urban structure concepts for the GTA and to provide a broad, strategic comparison of the three concepts with particular emphasis on their infrastructure requirements (e.g. transportation, hard services, human services, open space) and the capital costs of such facilities, as well as impacts on the immediate hinterland of the GTA. The comparison is also to include other important criteria such as environmental, economic and energy implications and the ability to achieve sustainable development, help preserve the regional and global environment, and maintain at as high a level as feasible the quality of life for those living and working in the GTA and areas surrounding it. Major influencing issues and policy aspects inherent in each urban structure concept are also to be identified and discussed.

1.3 NOT A PLANNING STUDY

It is important to emphasize that this is not a planning study in that none of the three concepts is being put forward as a recommended plan. Rather, each of the concepts is a case study, postulated in order to examine the infrastructure and related functional and quality aspects of three quite different urban structure possibilities for the GTA. The study results will help provide a basis for decisions on the nature of the next phase of the strategy.

The study is, therefore, a pre-planning exercise, aimed at providing basic information regarding the three generic concepts, as a basis for consideration and discussion by the public at large and by those responsible for managing, developing and servicing the GTA. Insights resulting from the study may be expected to influence subsequent planning activities. For example, it is possible that hybrid urban structure/infrastructure concepts may be developed subsequently, drawing on the most promising aspects of the original three generic concepts, and that one or some combination of these may be adopted as a planning framework for ongoing development and infrastructure decisions. Such a framework is needed, not only for the next 20 or 30 years but also to appreciate the longer term implications (i.e. beyond 30 years) of several development scenarios.

This pre-planning study is the first step: a "what if" exercise to demonstrate the basic urban structure and infrastructure attributes of three very different scenarios for the GTA 20 or 30 years from now.

Metric units are generally used in this report, except that population densities are presented and discussed in terms of people per acre and other imperial measures are used where the data were available in those units. A similar mixture of metric and imperial units is used in the background reports, based on discussions with the Urban Structure Subcommittee, such that units in common usage (such as people per acre, dwelling units per acre and gallons per day) are used as appropriate. Metric/imperial conversions are provided in the text but not in the exhibits owing to space limitations in the latter.

2. URBAN STRUCTURE CONCEPTS

2.1 THREE GENERIC CONCEPTS

In accordance with the terms of reference, the three urban structure concepts were developed following the prescribed guidelines:

1. a status quo concept, representing a continuation of existing trends, characterized by substantial population growth in the suburban regions at relatively low density, with continuing concentration of office development downtown and in various subcentres in Metro and the four adjacent regions (designated as **Concept 1, Spread**);

2. a concept in which substantial additional population growth/ intensification occurs within Metro Toronto, and other "mature" urbanized areas adjacent to Metro along with further intensification of employment activities, such that the rate of urbanization occurring beyond Metro boundaries would be significantly reduced (referred to as **Concept 2, Central**); and

3. an intermediate concept in which residential and employment growth occurs primarily in and around various existing communities in a compact form, resulting in reduced consumption of undeveloped land relative to Concept 1 (referred to as **Concept 3, Nodal**).

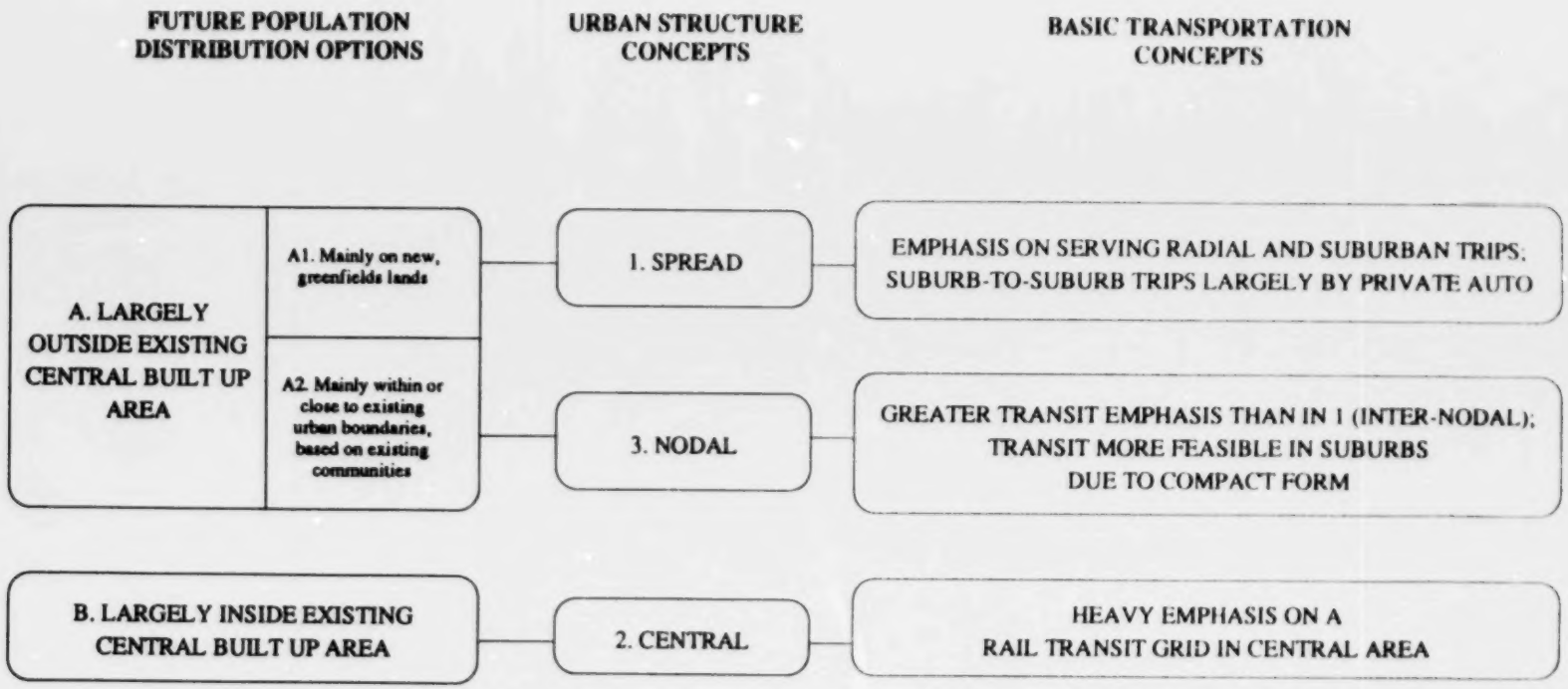
The three concepts are generic in that Concepts 1 and 2 are intended to test relative extremes of low and high population density and population/employment mix respectively, while Concept 3 will test an urban form aimed at compact, nodal growth with a more balanced population/employment mix and distribution of growth in all five regions of the GTA. Background Report No. 1: Description of Urban Structure Concepts provides a more detailed description of each of the three concepts; they are described more broadly in this Summary Report.

2.2 TYPOLOGY

In order to help understand the basic differences and logical origins of the three urban structure concepts, Exhibit 1 presents a typology, or basic classification system, for the three concepts.

In a "macro" sense, there are two basically different options for distributing the approximately 2 million additional people expected to be living in the GTA in 2021 relative to the current population of about 4 million. In the exhibit, we label these A and B, as follows:

EXHIBIT 1: GTA URBAN STRUCTURE CONCEPTS: TYPOLOGY


FUTURE POPULATION DISTRIBUTION OPTIONS
URBAN STRUCTURE CONCEPTS
BASIC TRANSPORTATION CONCEPTS
A. LARGELY OUTSIDE EXISTING CENTRAL BUILT UP AREA
A1. Mainly on new, greenfields lands
A2. Mainly within or close to existing urban boundaries, based on existing communities
B. LARGELY INSIDE EXISTING CENTRAL BUILT UP AREA
1. SPREAD
3. NODAL
2. CENTRAL
EMPHASIS ON SERVING RADIAL AND SUBURBAN TRIPS; SUBURB-TO-SUBURB TRIPS LARGELY BY PRIVATE AUTO
GREATER TRANSIT EMPHASIS THAN IN 1 (INTER-NODAL); TRANSIT MORE FEASIBLE IN SUBURBS DUE TO COMPACT FORM
HEAVY EMPHASIS ON A RAIL TRANSIT GRID IN CENTRAL AREA

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A. future new population is largely distributed **outside** the existing central built up area;

B. future new population is located largely **inside** the existing central built up area.

These two distributions of population growth are fundamentally different, such that they are expected to exhibit major infrastructure differences and impacts in all major areas considered under this study (transportation, hard services, greening/environment, human services, external impacts).

Within option A there are two basic ways in which the population and related employment could be distributed, as follows:

> **Spread distribution:** relatively low density, evenly distributed population and employment distribution occurring mainly on new, "greenfields" land (although with some significant employment concentrations as in the existing situation);
>
> **Nodal:** a more clustered distribution of population and employment into higher density nodes located mainly within or adjacent to existing urban boundaries but associated with existing **suburban** communities (e.g. Milton, Richmond Hill) as well as those in the central, built-up areas, producing a more compact urbanized form.

As shown in Exhibit 1, these two ways of distributing population and employment under Option A in which most such new development takes place **outside** the central existing built up area, correspond to Concept 1, Spread and Concept 3, Nodal respectively. As described further below, Concept 1 is postulated as having a somewhat higher population in the four regions adjacent to Metro Toronto than is the case for Concept 3; this difference is larger for York, Durham and Halton than it is for Peel, reflecting the fact that Peel contains the major cities of Mississauga and Brampton which are reaching "maturity" as contiguous parts of the GTA's main urbanized area, and which may therefore be considered as transitional between the mature urban state of Metro Toronto with essentially no greenfields lands left for development and the other three suburban regions which are characterized by smaller urban communities still having relatively easy access to adjacent greenfields land. The main difference between the two concepts, however, is the spread out, lower density nature of Concept 1 (most of which occurs on new, greenfields land) versus the more compact, nodal distribution in

Concept 3 (much of which would be redevelopment, plus higher density development on adjacent new land).

The other fundamental population distribution, characterized as option B above with most of the new population locating **inside** the existing central built up area, leads directly to urban structure Concept 2, Central. It would, in theory, be possible also to postulate two ways of distributing population under the centralized option: one in which redevelopment would occur fairly uniformly throughout the urbanized area, and the other in which redevelopment would be more concentrated into specific sites. The first of these was not developed into a concept for further study, mainly because it would be less practical to redevelop and intensify the population on every city block than it would be to leave the majority of such blocks essentially as they are now (possibly with some infill, intensification along major arteries, and higher utilization of existing housing stock), with the major population growth occurring by creating residential density on currently under-utilized industrial or institutional land. The other reason for selecting this sub-option for Concept 2 is that such a distribution of population and employment is more efficiently served by public transit than would be the case for a more uniform distribution of people and jobs; since it is a basic premise that the Central concept would require a greatly increased emphasis on transit, it is therefore logical to select the more site specific form of Concept 2 for analysis under this study. Population and employment intensification will tend to occur on land which is well served by existing or committed transit/commuter rail lines and which is currently not used to its potential.

2.3 MAJOR ISSUES

A number of important issues and principles were considered in developing the three urban structure concepts, as follows:

- the "base case" population and employment forecasts to 2021, prepared during the fall of 1989 by the Greater Toronto Coordinating Committee (GTCC) and its consultants (Clayton Research Associates Limited and Hemson Consulting Ltd.), in collaboration with the regional municipalities, were taken as the basis for Concept 1, Spread. This reflects the premise that the GTCC projections are an extension of existing trends. They are not targets, and we understand that these projections will be updated annually. This assumption and definition of Concept 1 was confirmed by the Urban Structure Subcommittee at the meetings on February 27 and March 9, 1990;

- the GTA totals for population and employment, as projected under the GTCC "base case", were taken as the GTA totals also for Concepts 2 and 3, in order that valid comparisons could be drawn among the three concepts in terms of overall costs for infrastructure, etc. It is recognized that overall population and employment growth may be affected by conditions experienced under the three concepts, but such differences in general are very difficult to quantify and, if this were attempted, would complicate the comparisons;

- Concept 2, Central, reflects a fairly extreme level of population intensification in Metropolitan Toronto and adjacent urbanized areas, in order to test the impact of higher population density in existing central, urbanized parts of the GTA, and a more even balance between population and employment within Metro and in each of the surrounding regions. The intent is to test as high a level of population in Metro by 2021 as feasible, bearing in mind redevelopable land areas and reasonable redevelopment densities in Metro and also recognizing existing (late 1989) population levels and approved developments (although not necessarily Official Plan levels) in the rapidly growing suburban regions;

- similarly, the variety of locations and sizes of development nodes under Concept 3, Nodal, reflects the locations of existing established communities, locations with high accessibility under the existing and potentially expanded transportation network for this concept, and considerations of available land, distance from the Metropolitan centre, and transportation capacity.

Accessibility, for all three concepts, includes intercity transportation and access to major facilities (e.g. Pearson International Airport, a possible new airport in north Pickering, Union Station) and major recreational areas, as well as transit and road connections for intra-GTA passenger and goods movements.

2.4 OVERVIEW DESCRIPTION

Regional Distributions of Population and Employment

Exhibit 2 shows the actual distribution of population and employment by region in the base year (1986) and the postulated distribution for each of the future years (2011 and 2021) for Concepts 1, 2 and 3. Also shown in each instance are the ratio of total employment to residential population in each region, referred to in this presentation as the activity rate, and estimates of the urbanized area and gross urban density for each concept.

The source of the base year numbers is the 1986 census and the reports prepared by Clayton Research Associates Limited and Hemson Consulting Ltd. for the GTCC in October, 1989 in support of the GTCC projections referred to earlier. Similarly, as noted above, the source for the Concept 1 figures is the Clayton and Hemson reports, taking the "base case" projections. It can be seen that Concept 1 represents a greater increase in jobs relative to people within Metro than is now the case, and a relatively minor increase in this ratio in three of the four adjacent regions, with a reduction in Durham. An important implication of this concept, therefore, is a strengthening of the trend toward long work trips from residential areas in the surrounding regions to jobs in Metro, with corresponding demands on the transportation infrastructure.

Concept 2, Central, was based in part on an estimate of how much residential population could be accommodated in Metro Toronto if major parcels of land were redeveloped for residential and mixed residential/employment uses at appropriate redevelopment densities. As described more fully below in Chapter 4, it was estimated that, under this concept, up to 4 million people could conceivably be accommodated in Metro Toronto; a slightly lower level of 3.8 million people was selected, for the year 2021, based on reasoning described in Chapter 4. The distributions of population and employment in Metro and the other four regions were then estimated reflecting the existing distributions and growth rates and reasonable trends in the activity rate in each region. An examination of the resulting activity rates shows that this concept provides a test of a greater balance between population and jobs within each region, with Metro having levels comparable with those in 1986 and the surrounding regions having a significantly better balance between people and jobs than would be the case under Concept 1.

Concept 3 is intermediate between Concepts 1 and 2, with a 2021 population of 2.8 million in Metro Toronto and correspondingly

EXHIBIT 2

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GTA Urban Structure Concepts: Overview of Population and Employment Distributions by Region

	DURHAM		HALTON		METRO		PEEL		YORK		GTA TOTAL	
BASE YEAR (1986)												
Resident Population, P (000's)	326		271		2193		592		351		3733	
Total Employment, E (000's)	137		119		1349		304		170		2079	
Activity Rate (E/P)	0.420		0.439		0.615		0.514		0.484		0.557	
Urbanized Area (000's of acres)	49.2		45.4		152.9		74.1		54.8		376.4	
Gross Density ([P+E]/Urbanized Area)	9.4		8.6		23.2		12.1		9.5		15.4	
	2011	2021	2011	2021	2011	2021	2011	2021	2011	2021	2011	2021
CONCEPT 1: Spread												
Resident Population, P (000's)	673	794	497	593	2358	2428	1060	1198	851	1007	5438	6020
Total Employment, E (000's)	280	309	244	271	1686	1724	593	631	456	505	3259	3440
Activity Rate (E/P)	0.416	0.389	0.491	0.457	0.715	0.710	0.559	0.527	0.536	0.501	0.599	0.571
Urbanized Area (000's of acres)	87.3	99.3	74.3	84.7	152.9	152.9	119.0	129.3	116.5	133.5	550.0	599.7
Gross Density ([P+E]/Urbanized Area)	10.9	11.1	10.0	10.2	26.4	27.2	13.9	14.1	11.2	11.3	15.8	15.8
CONCEPT 2: Central												
Resident Population, P (000's)	455	475	362	378	3310	3800	794	828	517	540	5438	6020
Total Employment, E (000's)	253	263	203	211	2046	2183	465	479	293	304	3259	3440
Activity Rate (E/P)	0.557	0.554	0.560	0.560	0.618	0.574	0.585	0.578	0.566	0.564	0.599	0.571
Urbanized Area (000's of acres)	68.4	70.8	59.6	61.7	152.9	152.9	95.5	98.3	77.4	80.1	453.8	463.8
Gross Density ([P+E]/Urbanized Area)	10.4	10.4	9.5	9.5	35.0	39.1	13.2	13.3	10.5	10.5	19.2	20.4
CONCEPT 3: Nodal												
Resident Population, P (000's)	595	681	464	545	2626	2800	1050	1190	703	804	5438	6020
Total Employment, E (000's)	288	312	240	266	1748	1794	600	651	383	417	3259	3440
Activity Rate (E/P)	0.484	0.458	0.517	0.488	0.666	0.641	0.571	0.547	0.545	0.519	0.599	0.571
Urbanized Area (000's of acres)	77.4	84.7	63.5	69.4	152.9	152.9	109.9	118.4	88.0	96.4	491.7	521.8
Gross Density ([P+E]/Urbanized Area)	11.4	11.7	11.1	11.7	28.6	30.0	15.0	15.5	12.3	12.7	17.7	18.1

Note: Concept 1 is the GTCC "Base Case" Projection.

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higher populations in the four other regions than would be the case under Concept 2. Similarly, the activity rates under Concept 3 would be intermediate between those of Concepts 1 and 2.

As noted earlier in Section 2.2, while there is some similarity between the levels of population and employment in each region under Concepts 1 and 3 (particularly in Peel), there would be a significant difference in the density and distribution of urban development, with Concept 3 portraying a more compact, nodal type of development and Concept 1 portraying a more spread development at lower densities.

Demographic, Economic and Immigration Assumptions

Implicit in all three concepts is the assumption that, generally, existing demographic trends, social values and immigration policies will persist during the 30 years under consideration. The basic demographic trends include:

- continuing rapid entry of women into the out-of-home labour force, but at reduced rates relative to the last two decades, reflecting increasing saturation of participation rates for women;
- continuing rapid rates of household formation until the turn of the century, as the remainder of the baby boom generation enters the real estate market;
- an increasing number of retired persons living in the community, particularly following 2011 as the baby boom generation starts to reach retirement age;
- reflecting the above, an increase in the overall participation rate between 1986 and 2011, followed by a decline to an intermediate level by 2021;
- a persisting trend to smaller household sizes, but at declining rates relative to those experienced in the past 20 years;
- an overall age distribution for the GTA which is identical in all three concepts.

In terms of social values and economic conditions, the following assumptions are implicit in all three concepts:

- a continuing belief in social democracy;

- increasing policies and actions to preserve the environment and natural resources on a "sustainable development" basis;

- continuing reliance on a market-based economy with the expectation of continuing growth in the context, however, of economic uncertainties relating to increasing levels of international competition, significant changes in trading agreements and patterns, and the extremely high debt load of the Government of Canada and other public and private sector participants affecting the economy of the GTA;

- persistence of the GTA as the nation's prime financial, commercial and industrial centre;

- continuation of the federal policy of income redistribution between regions of the country, without which there could be increased in-migration to the GTA from less prosperous parts of Canada.

It is recognized that there are tensions between some of the above assumptions (e.g. possible impacts on economic growth rates if "sustainable development" limits are agreed to).

Assuming that the low fertility rate which has applied since the mid-1960's persists, the most important variable affecting future GTA population growth is the rate of net in-migration. The population projections on which this study is based assume that present Canadian immigration policy will persist, but with a future rate of net in-migration to the GTA about 60% higher than was experienced during the period 1971-1986: 40,000 per year versus 25,000 per year. (See also Background Paper No. 2: Minimal Growth Option.) While a relatively high proportion of GTA in-migrants are likely to be from abroad, it is assumed that the new arrivals will tend to adapt to Canadian conditions and social customs, including housing preferences, in a manner similar to that which has been experienced during the past two or three decades. It is important to recognize that any significant changes in Canada's immigration policy, a federal jurisdiction, would strongly affect population growth rates in the GTA; a more restrictive policy would result in lower population/employment levels than those projected for the GTA in this study and, conversely, higher international immigration rates would contribute to a higher GTA growth rate.

The Minimal Growth Option

Background Report No. 2 was commissioned to explore the possibility of government intervention to reduce the overall rate of growth of the GTA, with the general intent of distributing such growth more widely among "satellite" cities and towns beyond the GTA boundaries, such as Hamilton, Kitchener/Waterloo, Cambridge, Barrie, Peterborough, Port Hope, etc. The report reviews the experience of other countries in attempting to limit and decentralize the growth of their major metropolitan areas, and concludes that the success of such policies has been very limited in free market western countries, third world developing countries and even in totalitarian countries. If growth pressures in the metropolis are vigourous (usually as a result of its dominant economic position in the country and/or a continuing net in-migration from rural areas and/or other countries) attempts to "manage" and decentralize the growth have tended to be largely ineffectual with the main result of driving up prices of land, housing and employment activities. If the major reasons for economic growth of the metropolis are weakening, government regulation may divert major economic activities away from the metropolis, and possibly out of the country entirely.

The report reviews the possibility of a government policy aimed at slowing the overall rate of growth of the GTA with the general intent of distributing it among satellite centres in Southern Ontario. It concludes that, in the context of the Canada-U.S. free trade agreement and changing world trade patterns, this would be a risky policy which would be as likely or more likely to divert such growth to upstate New York or other U.S. locations than to other parts of Ontario. It also points out the increasing importance of international immigration as the major on-going source of population growth for the GTA, as noted above. The point is made that this will be the major policy lever affecting the overall GTA growth rate during the coming decades, and policy discussions among representatives of the GTA, the Province of Ontario and the federal government should reflect this reality, recognizing that immigration policy is under federal jurisdiction.

2.5 CONCEPT 1: SPREAD

Concept Principles

As noted earlier, the regional and area municipal distributions of population and employment under this concept reflect the "base case" projections prepared by the GTCC during the fall of 1989.

Distribution of Population and Employment

Exhibit 5 of Background Report No. 1 provides a more detailed appreciation of the projected distribution of population and employment by area municipality under Concept 1. The gross densities at which this development is assumed to occur and the acres of greenfields land which would be consumed by 2011 and 2021 under these assumptions are also shown.

Since the GTCC projections were made at the area municipality level only as far as 2011, we distributed their regional projections for 2021 among area municipalities in each region, in accordance with the 2011 area municipality projections and reflecting an extension of similar trends.

Map of Concept 1

A map showing estimated urbanized areas under Concept 1, Spread, is shown in Exhibit 3. This shows graphically the large amount of greenfields land that would be consumed between the present day and the year 2021 at the relatively low densities postulated under this concept.

2.4 CONCEPT 2: CENTRAL

Concept Principles

As noted earlier, this concept is based in part on the selection of a postulated 2021 population level for Metro Toronto, taking into account the amount of suitable redevelopable land available in Metro and the number of people who could be housed on that land at appropriate redevelopment densities. The analyses on which a possible 2021 Metro population in the range of 3.8-4 million persons were based are presented in Background Report No. 1.

Based on these analyses it was concluded, from the land holding capacity point of view, that a future population of up to 4 million persons in Metropolitan Toronto would be feasible. It was decided, in consultation with the Urban Structure Subcommittee, to test a somewhat lower level of population intensification under Concept 2; that is, a Metro Toronto population of 3.8 million by 2021. This is based partly on the fact that this is slightly less than the population which could be accommodated in Metro if it had the same gross population density as currently exists in the City of Toronto, a density which can be visualized based on the actual situation in the City and which can be seen to be compatible with generally accepted levels of urban density and function for a large urban area.

Another reason for selecting the lower population level in Metro relates to current (December, 1989) population levels and rapid growth rates in the four other regions, particularly York. The

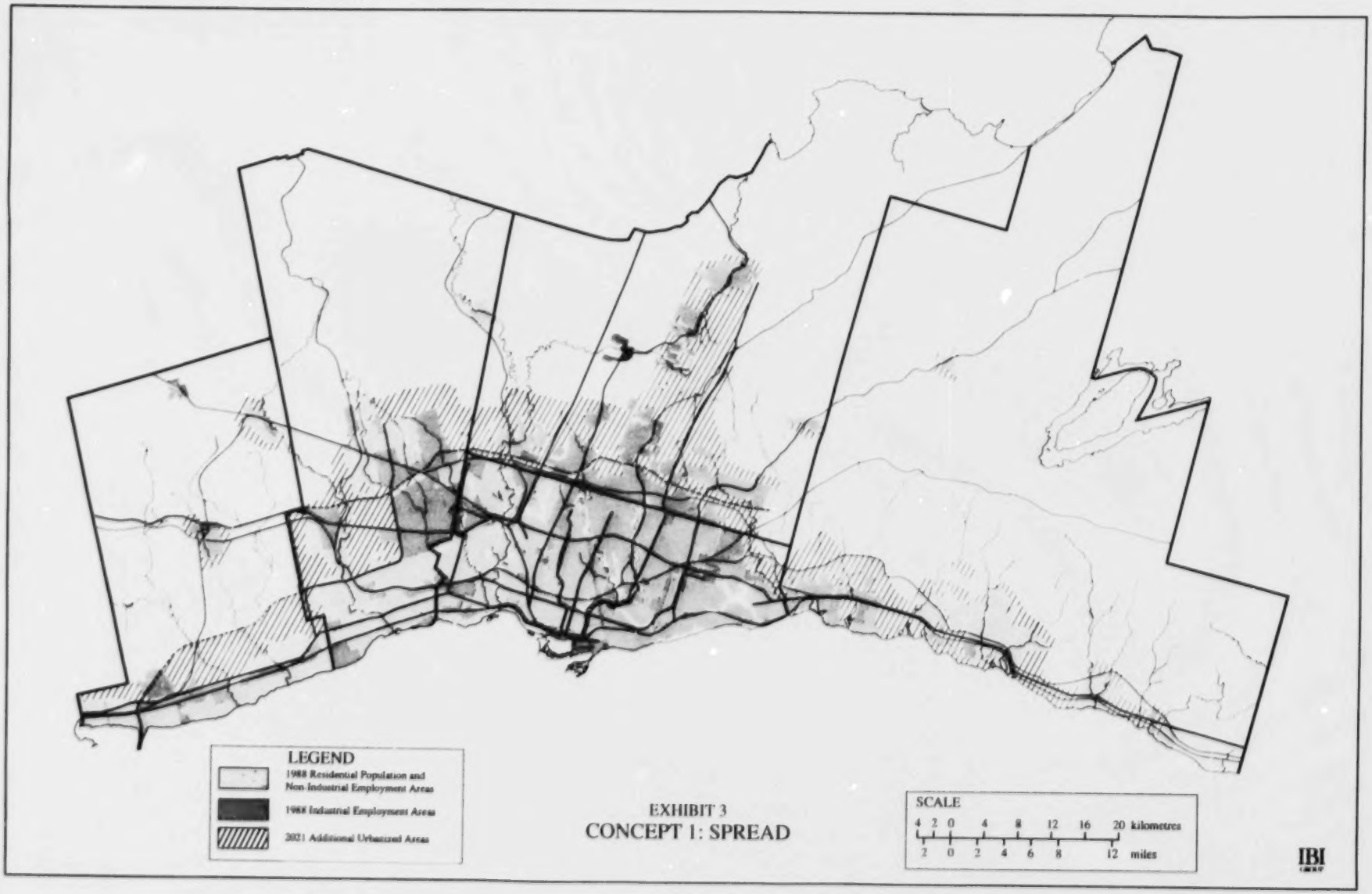
LEGEND
1988 Residential Population and Non-Industrial Employment Areas
1988 Industrial Employment Areas
2021 Additional Urbanized Areas
SCALE
4 2 0 4 8 12 16 20 kilometres
2 0 2 4 6 8 12 miles
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EXHIBIT 3
CONCEPT 1: SPREAD

postulated population distribution for Concept 2 (3.8 million population in Metro by 2021) is more compatible with current levels of existing and approved new population in the suburban regions, recognizing that existing initiatives and approved developments must continue. The approach taken in this study is to postulate an intensified/central concept which appears feasible based on the availability of developed and redevelopable land in the build up area. The next phase of the strategy would likely include studies intended to identify urban settlement options and the required policy changes to achieve the implementation of these options. For Concept 2, the latter could include changes to existing Official Plans and other policy changes to achieve population intensification in central, built-up areas. Other policy changes might apply to encourage the compact/nodal urban structure of Concept 3.

Map of Concept 2

The areas which would be urbanized between 1986 and 2021 under Concept 2 are illustrated in map form in Exhibit 4. A comparison with Exhibit 3 shows in graphic form that Concept 2 would consume substantially less greenfields land than would Concept 1. The difference, of course, is that as much as 11,000 acres (4,500 ha) of land within Metro Toronto, currently in industrial, institutional or other low density uses, would be redeveloped for higher density residential and mixed residential/employment uses under Concept 2 and, as shown in Exhibit 2, population levels in the four regions surrounding Metro would be considerably lower than they would under Concept 1.

Also shown conceptually in Exhibit 4 are possible locations of population/employment concentration in Metro and Mississauga under Concept 2. As noted earlier, these are based on designated centres, major sites of redevelopable land and, in the case of Mississauga, intensified population (as well as employment) in the Mississauga city centre.

2.5 CONCEPT 3: NODAL

Concept Principles

As described earlier, this concept assumes lesser concentration of resident population in Metropolitan Toronto than would be the case under Concept 2 (some 2.8 million people by 2021 under Concept 3, versus 3.8 million people under Concept 2) which would mean that 1 million additional people would be living in the four surrounding regions by 2021 under Concept 3 relative to Concept 2. This means that there would be almost as many people living in the four surrounding regions under Concept 3 as there would be under Concept 1, particularly in Peel Region.

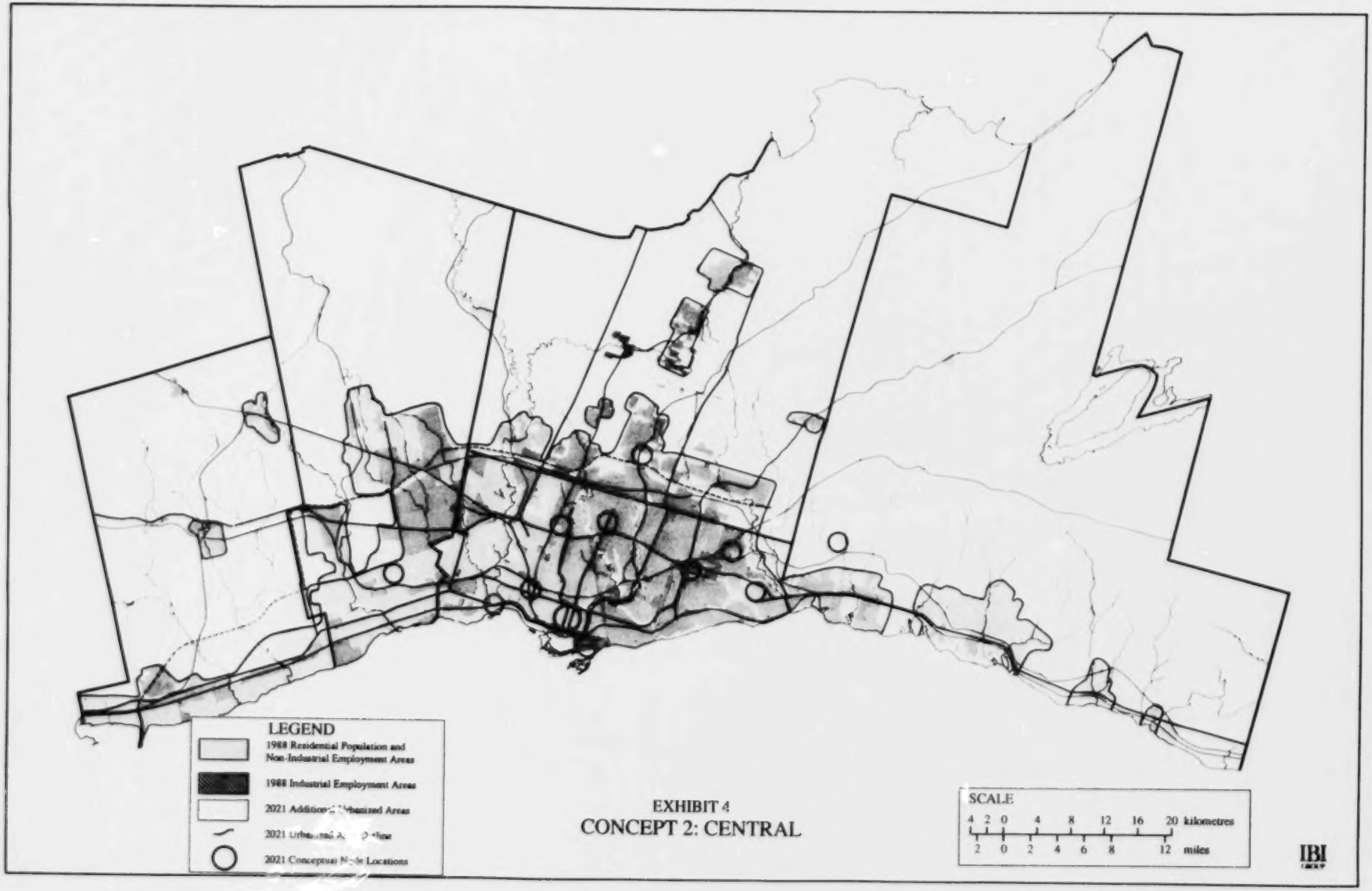
LEGEND
1988 Residential Population and Non-Industrial Employment Areas
1988 Industrial Employment Areas
2021 Additional Urbanized Areas
2021 Urbanized Area Boundary Line
2021 Conceptual Node Locations
SCALE
4 2 0 4 8 12 16 20 kilometres
2 0 2 4 6 8 12 miles
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EXHIBIT 4
CONCEPT 2: CENTRAL

The important distinction between Concepts 1 and 3, as noted earlier in Section 2.2, is that the density of population and non-industrial employment under Concept 3 would be higher in the four surrounding regions than it would under the spread city assumptions of Concept 1. This would be achieved in Concept 3 by a nodal urban form, with compact development in and around existing communities, closely integrated with existing development. Nodes of these types, including both residential population and employment, would be located particularly in communities well served by commuter rail or rapid transit.

Map of Concept 3

Concept 3 is shown conceptually in map form on Exhibit 5. In line with the earlier discussion in section 2.2, we have not attempted to show a hierarchy of nodes or even their exact locations on the map, in order to stress the "pre-planning" nature of this and the other two concepts. It will be noted, however, that there is a general correspondence between the locations of some nodes within the existing urbanized area under Concept 3 (as shown on Exhibit 5) and those for Concept 2 shown on Exhibit 4. This reflects the existence of the CBD and various city centres and the locations of major redevelopable land sites, as discussed earlier. The types of node locations conceptually illustrated in the four regions adjacent to Metro are intended to illustrate potential locations which reflect existing communities and existing or expanded transportation networks, particularly commuter rail and rapid transit.

At this stage, we have deliberately refrained from estimating the size and exact location of possible nodes, for the reasons outlined in the previous paragraph. The projected population and employment levels for 2011 and 2021 in each area municipality provide information on the assumed distribution of urbanization under Concept 3. For purposes of infrastructure analysis, we take into account the differences in gross density between Concept 3 and the other two concepts in each area municipality, as well as the possible locations of nodes under Concept 3 in broad terms, in estimating impacts on transportation capacity requirements, modal splits, water/sewer requirements, greening/environment and human services implications, etc.

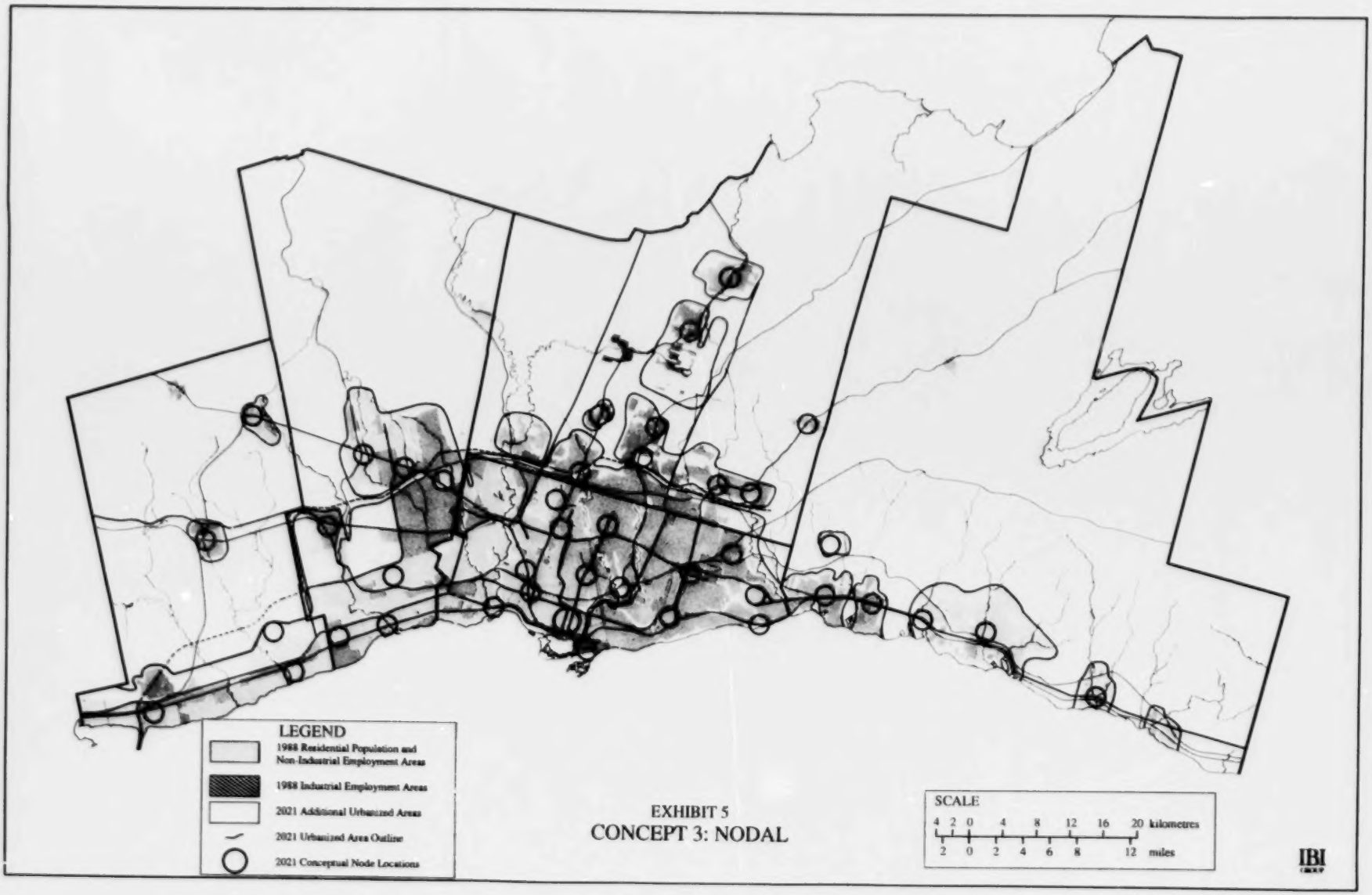
LEGEND
1988 Residential Population and Non-Industrial Employment Areas
1988 Industrial Employment Areas
2021 Additional Urbanized Areas
2021 Urbanized Area Outline
2021 Conceptual Node Locations
SCALE
4 2 0 4 8 12 16 20 kilometres
2 0 2 4 6 8 12 miles
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EXHIBIT 5
CONCEPT 3: NODAL

2.6 INFRASTRUCTURE

Transportation

Concept 1, Spread, is anticipated to have a transportation concept which emphasizes improved service for radial trips (between large, spread out resident population in the suburban regions and increased employment in the mature urban areas [much of it concentrated in the Metro CBD and other city centres]) and trips to more evenly distributed employment growth in the suburban areas. In order to serve the greatly increased radial demands while recognizing the space and other limitations on constructing new radial roads in urbanized areas, the transportation concept is expected to include improved commuter rail services, possible extensions of existing rapid transit lines into the adjacent regions, possible "crosstown" or "circumferential" rapid transit connectors between the radial "spokes" or commuter rail and rapid transit lines, and substantial improvements/extensions of both arterial roads and major highways in the suburban areas. Most such roads would likely carry bus routes, many with relatively low ridership because of the low density of population and employment. See Background Report No. 3, Transportation Systems, for more information on the transportation concept.

As also described in Background Report No. 3, Concept 2, Central, is anticipated to place the major transportation emphasis on a much improved grid of rapid transit and commuter rail lines within the existing urbanized area, with a strong emphasis on crosstown and circumferential lines as well as improved radial lines but with less emphasis on extending the latter beyond the existing central urban envelope, and a correspondingly reduced emphasis on road network improvements and expansions.

Concept 3, Nodal is anticipated to have a transportation concept with some similarities to that for Concept 1 but which has a considerably greater transit emphasis in terms of the capacity and service level provided, and a greater emphasis on crosstown/ circumferential rapid transit or commuter rail lines providing more direct connections among the nodes in both suburban and central areas. Correspondingly, there is less emphasis on freeway expansion in Concept 3 although it would have substantial expansion of the arterial road system, in the same order as that for Concept 1.

Hard Services

The costs of expanding trunk water and sewer systems were estimated for each of the three concepts, as described in Background Report No. 4, Water, Sewers and Solid Waste. Solid waste disposal costs were also estimated as described in that report showing the differences for centralized and decentralized systems.

Greening/Environment

Background Report No. 5, Greening/Environment, describes the requirements of the regional greenlands concept to ensure that the amount, quality and locations of passive greenlands and recreational areas are appropriate to a GTA of 6 million people in 2021. The compatibility of each concept with this requirement is described and costed. Also shown in this report is the amount of agricultural land, forestry land and mineral resources land that would be consumed by each of the three concepts as urbanization continues to move out into the countryside. The greening/environment background report also deals with requirements to improve the quality of storm water runoff, which has a major impact on the quality and recreational capability of river valley areas and Lake Ontario beaches in and around the GTA. Also falling under the heading of greening/ environment are analyses of vehicular atmospheric emissions, which affect the air quality, and transportation energy consumption levels, for each of the three urban structure concepts. The latter two types of information are described in Background Report No. 3 and included in the overall comparison as described in Background Report No. 7. The issues of green areas, land consumption, maintenance of natural resources, air and water pollution, toxic soils, and energy consumption, as discussed in Background Report No. 5, are directly relevant to the overall issue of achieving sustainable development and some of the major cost implications of this.

Human Services

The human services requirements of each of the three concepts are conceptually described, broadly costed and compared in Background Report No. 6: Human Services. This report describes, in general terms, the implications of providing health, education, cultural/recreation, social, and protection services in the context of each of the three urban structure concepts. Where feasible, capital cost estimates are provided for each of the concepts. Anticipated effectiveness and efficiency of human services delivery, and operating cost implications, are treated more qualitatively in the report as input to the overall comparison of urban structure concepts.

3. COMPARISON OF CONCEPTS

3.1 APPROACH

The consultant team developed and compared the above three urban structure concepts in consultation with the Urban Structure Subcommittee (USSC). As noted above, concepts were prepared as the basis for assessing the infrastructure and related needs, including capital costs, of each concept in terms of the following:

- transportation requirements, including intra-GTA facilities and connections to the surrounding areas along with transportation/utility corridors and urban separators;
- hard servicing needs in terms of trunk, water and sewer systems and solid waste disposal facilities;
- greening/environmental implications, the ability to provide urban separators, and impacts on preservation of the natural attributes of the GTA and the potential to recover those that are currently threatened or require substantial rehabilitation;
- human services and facilities, including social, health, education, protection and recreational requirements and their capital costs; and
- external impacts on the communities and areas surrounding the GTA.

Comparisons of the three concepts were then developed based on the above analyses and involving other, more qualitative criteria. The results of this work are summarized in the following two chapters and described more fully in Background Report No. 7: Comparison of Urban Structure Concepts.

3.2 COMPARISON CRITERIA, FACTORS AND MEASURES

Eight criteria were defined for the comparison, as follows:

1. urban structure;
2. economic impetus;
3. transportation;
4. hard services;
5. greening/environment;
6. human services;

7. external impacts;

8. overall infrastructure costs.

A number of factors were defined under the various criteria and, within each factor, one or more measures were developed as a basis for describing and expressing differences among the three urban structure concepts. In the remainder of this chapter we outline the various factors and measures used to assess the extent to which each concept is rated positively or negatively in terms of each criterion.

Criterion 1: Urban Structure

1.1 Amenities and Diversity:

- Has a **low impact on existing community character**, e.g. size and density.
- Helps to provide a **high range of community sizes.**
- Helps to provide a **high range of community diversity** in terms of the types and mix of housing, employment, human services and recreation.

1.2 Integration and Efficiency:

- Compact development in and adjacent to established urban communities builds on and has **high utilization of existing urban infrastructure** and helps protect rural areas.
- Provides a **high regional and local balance of people and jobs**, by type, to help reduce commuting distances.

Criterion 2: Economic Impetus

2.1 Economic Growth Opportunities:

- Has a **low risk of land price increases**, which might result from government regulation, thereby moderating the risk of price increases for housing and economic activities by maintaining a high rate of delivery of serviced land.
- Has **low per capita land development costs,** thereby contributing to economic efficiency.

2.2 Impact on Agriculture:

- Has **low encroachment on Class 1, 2 and 3 agricultural land.**

2.3 Impact on Natural Resources:

- Has **low impact on forest resources** in the GTA.
- Has **low impact on mineral resources** in the GTA.

Criterion 3: Transportation

3.1 Choice of Modes and Service Levels:

- Provides **high transit accessibility and level of service.**
- Provides **high road accessibility and level of service.**
- Provides **high effectiveness of external (intercity) connections and access to intercity terminals.**
- Provides **high accessibility for the urban population to reach rural and vacation areas.**

3.2 Transportation Efficiency/Costs:

- Has **low average trip times, distances and costs.**
- A **high proportion of each region's work trips remain in the region.**
- Has **high transit efficiency and cost recovery** from the fare box.
- Urban structure **reduces pressures for continuing growth of road traffic congestion.**
- Has **reduced requirements for school busing.**
- Allows **more opportunity to provide transit services for mobility-handicapped persons.**
- Required transportation improvements have a **low capital cost.**
- The resulting transportation system has a **low operating cost.**

Criterion 4: Hard Services

4.1 Trunk Water and Sanitary Sewerage Systems:

- Has **low capital cost to expand trunk water and sewerage systems.**

4.2 Solid Waste Management:

- Has **low costs to provide and operate solid waste disposal systems.**

4.3 Land Development and Redevelopment:

- Has **low capital costs for land development and redevelopment and local hard services** including site preparation, water/sewer services, roads, sidewalks, street lighting and electric power utilities.

Criterion 5: Greening/Environment

5.1 Greening:

- Has **high compatibility with the regional "greenlands" concept.**
- Has **high available amount of passive open space** (e.g. river valleys and conservation areas).
- Has **high ease of disposal of contaminated soils.**
- Has **high potential for cleanup of contaminated soils.**

5.2 Sustainable Development:

- Has **high potential for improving the quality of storm water drainage.**
- Results in **reduced degradation of atmospheric quality** (as measured by relatively low transportation emissions).
- Has **low level of transportation energy consumption.**

Criterion 6: Human Services

6.1 Level of Service, Accessibility, Efficiency and Capital Costs of Human Services:

- Has **high effectiveness/efficiency of health services.**
- Has **high effectiveness/efficiency of education services.**

- Has **high effectiveness/efficiency of cultural and recreational services.**
- Has **high effectiveness/efficiency of social services.**
- Has **high effectiveness/efficiency of protection services.**

Criterion 7: External Impacts

7.1 Nature and Extent of Impacts on Adjacent Hinterland:

- Produces **low pressure for overspill urban development.**
- Results in **low growth of GTA-oriented road commuting traffic.**

Criterion 8: Overall Infrastructure Costs

8.1 Capital Costs:

- Has **low overall transportation, hard services, greening/environment and human services capital costs.**

8.2 Operating Costs:

- Has **low operating costs.**
- Has **positive human services operating cost implications.**

The manner in which these criteria, factors and measures are applied for comparison purposes, and the results obtained, are described more fully in Background Report No. 7. In this Summary Report we move directly to a presentation of the results.

3.3 COMPARISON RESULTS

Exhibit 6 provides a graphical summary of the comparisons as developed in the previous section and listed in Section 3.2. As shown, a circle is used to depict graphically the rating of each concept in terms of each measure: the circle is completely black if the concept receives a **high** rating, is three-quarters black if it receives a **medium-high** rating, is half black if it receives a **medium** rating, is one-quarter black if it receives a **medium-low** rating, and is completely white (open) if it receives a **low** rating. Visually, therefore, the greater the amount of black showing in the circles for a given concept, the higher are its ratings.

The purpose of providing this summary array is to assist readers in seeing the entire list of comparison measures, and their application to the three concepts, on a single page in order to help the process of interpreting the overall comparison and its various components.

EXHIBIT 6
GTA URBAN STRUCTURE CONCEPTS
COMPARISON MEASURES TABLE

CRITERIA		MEASURES	1. SPREAD	2. CENTRAL	3. NODAL
1. Urban Structure	1.1 Amenities and diversity	Low impact on existing community character	◐	◐	◕
		High range of community sizes	○	◐	●
		High range of community diversity	◕	◐	●
	1.2 Integration and efficiency	High utilization of existing infrastructure	◕	◕	◐
		High regional/local balance of people and jobs	○	●	◕
2. Economic Impetus	2.1 Economic growth opportunities	Low risk of land price increases due to government regulation	◕	◕	◐
		Low land development costs which contribute to economic efficiency	○	●	◐
	2.2 Impact on Agriculture	Low encroachment on agricultural land	○	◕	◐
	2.3 Impact on Natural Resources	Low impact on forest resources	○	◕	◐
		Low impact on mineral resources	◕	◕	◐
3. Transportation	3.1 Choice of modes and service levels	High transit accessibility and service level	○	●	◐
		High road accessibility and service level	●	○	◐
		High effectiveness of intercity connections	◕	◐	◐
		High population accessibility to rural areas	◕	◕	◐
	3.2 Transportation efficiency/costs	Low average trip times, distances and costs	○	●	◐
		High proportion of each Region's work trips remain in the Region	○	●	◐
		High transit efficiency and cost recovery	○	●	◐
		Reduced road traffic congestion growth	◐	◐	◐
		Reduced requirements for school busing	○	●	◕
		Better opp'y to provide handicapped transit	◐	●	◕
		Low transportation capital costs	◐	◐	◐
		Low transportation operating costs	○	●	◐
4. Hard Services	4.1 Trunk water and sanitary sewerage systems	Low water/sewer trunk costs	◐	◐	◐
	4.2 Solid waste management	Low costs for solid waste disposal systems	◐	◐	◐
	4.3 Land development and redevelopment	Low capital costs for land development and redevelopment re local services	○	●	◕
5. Greening/ Environment	5.1 Greening	High compatibility with regional greenlands concept	○	●	◐
		High available amount of passive open space (eg. river valleys and conservation areas)	●	○	◕
		High ease of disposal of contaminated soils	◕	○	◐
		High potential for cleanup of contaminated soil	◕	◕	◐
	5.2 Sustainable development	High potential for improving quality of stormwater drainage	◕	◕	◐
		Reduced atmospheric quality degradation (eg. low transportation emissions)	○	●	◐
		Low level of transportation energy consumption	○	●	◐
6. Human Services	6.1 Level of service, accessibility, efficiency and capital costs of human services	Effectiveness/efficiency of health services	◐	◕	◐
		Effectiveness/efficiency of education services	◕	◕	◐
		Effectiveness/efficiency of cultural and recreational services	◕	◐	◕
		Effectiveness/efficiency of social services	◕	◐	◕
		Effectiveness/efficiency of protection services	◕	◐	◕
7. Ext. Impacts	7.1 Nature/extent of impacts on the adjacent hinterland	Low pressure for overspill development	○	◐	◐
		Low growth of GTA oriented road traffic	○	◕	◕
8. Overall Infrastructure Costs	8.1 Capital costs	Low overall transportation, hard services, greening/environment and human services capital costs	◐	◐	◐
	8.2 Operating Costs	Low operating costs	○	●	◐
		Human services operating cost implications	◕	◕	◕

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LEGEND: Relative Rating Symbols

High Rating	●
Medium-High Rating	◕
Medium Rating	◐
Medium-Low Rating	◕
Low Rating	○

More details on the reasoning behind the various ratings are presented in Background Report No. 7.

In accordance with the Terms of Reference, no attempt is made in this study to derive a cumulative rating or "bottom line" comparison of the three concepts. There are two important reasons for this:

1. There is a substantial amount of overlap in a number of the comparison measures used; any attempt to derive a cumulative total would have to account for this and correct for the effects of "double counting".

2. A simple addition of all of the ratings for a particular concept (e.g. on a numerical basis) would make the implicit assumption that each of the measures is equally important in its contribution to an overall "score" for the concept. It is very unlikely that a given group of people assessing the concepts would assign an equal weight to each measure. Equally, it is rather unlikely that any two groups would agree on the relative weighting to be assigned to each measure, if an attempt were made to take this into account.

The information and comparisons provided here are meant to stimulate widespread discussion among political leaders, professional staff, interest groups and the public at large which will be necessary before general conclusions can be drawn regarding the relative importance of the various criteria and measures and, in this context, a preferred future urban structure concept for the Greater Toronto Area.

There is a great deal of detail presented in Exhibit 6 which, while useful in one respect, makes is somewhat difficult to identify some of the basic similarities, differences, strengths and weaknesses of the three concepts. The interpretive comments provided in Chapter 4, below, are intended to assist in this process.

4. INTERPRETIVE COMMENTS

4.1 COMPARISON HIGHLIGHTS

Capital Costs

The capital cost estimates presented in the previous chapter are summarized in Exhibit 7, which shows the main subheadings within each major component, as well as the component totals. Estimated federal costs (for airports and a rail freight link between the CP and CN main lines in Halton and Peel) are not included in the exhibit, since they would be the same for all three concepts; see Exhibit 13 and also Background Report No. 3).

Capital Cost Differences

The essential (and perhaps unexpected) finding from Exhibit 4 is that, while the estimated capital costs (cumulative requirements over the period 1990-2021) are very large for each of the three concepts, lying in the range $74-$79 billion, the differences among the three concepts are insignificant relative to the absolute size of the cumulative capital costs estimated and the uncertainty range of the estimates. This general conclusion is true even if the lower end of the cost range is taken for Concept 2 ($73.8 billion) and for Concept 3 ($75.2 billion) relative to the single estimate for Concept 1 ($79.3 billion) since the differences are less than 10%.

A similar conclusion can be drawn regarding two of the four major capital cost components: Human Services at $29-30 billion for each of the concepts, and Transportation at $27-29 billion for each of the concepts. The other two components show more significant variation, however:

- **Hard Services**, for which Concept 1, Spread, has the highest cost at $19.5 billion, Concept 2, Central, the lowest at $12.7 billion and Concept 3, Nodal, an intermediate cost at $14.7 billion; and

- **Greening/Environment**, for which Central has the highest cost at $3.1-$8.0 billion, Spread the lowest at $3.1 billion and Nodal an intermediate cost at $3.1-$6.7 billion.

Looking within each component subtotal, the subcomponents showing the most difference among concepts are:

EXHIBIT 7

CAPITAL COST SUMMARY

(CUMULATIVE 1990-2021 TOTALS, IN BILLIONS OF 1990 DOLLARS)

	1. SPREAD	2. CENTRAL	3. NODAL
TRANSPORTATION			
TRANSIT	7.16	14.41	11.58
ROADS	19.93	13.20	17.04
SUB-TOTAL	27.09	27.61	28.62
HARD SERVICES			
WATER/SEWER	3.72	3.68	3.68
LOCAL SERVICES/ROADS	15.76	8.98	11.04
SUB-TOTAL	19.48	12.66	14.72
GREENING/ENVIRONMENT			
PASSIVE OPEN SPACE (LAND)	1.10	1.10-6.00	1.10-4.70
STORMWATER QUALITY	2.00	2.00	2.00
SUB-TOTAL	3.10	3.10-8.00	3.10-6.70
HUMAN SERVICES			
HOSPITALS	4.45	5.56	4.75
SOCIAL & OTHER HEALTH SERVICES	2.68	2.68	2.68
EDUCATIONAL FACILITIES	6.40	4.20	4.79
PROTECTION	2.83	2.83	2.83
CULTURE & RECREATION	10.90	10.90	10.90
PARKS (LAND)	2.32	4.22	2.82
SUB-TOTAL	29.58	30.39	28.77
TOTAL	79.25	73.76-78.66	75.21-78.81

NOTES:

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- This table includes expenditures currently commited or announced by governments in the area as well as for longer range needs to 2021.
- The above costs do not include federal costs for new facilities serving the entire GTA, such as for airports, high speed interurban rail service or freight rail links, which would be similar for all concepts.
- If existing capital expenditure levels (averaged for the period 1984-88, see Exhibits 8 and 9 following) are extrapolated for the period 1990-2021 at expanded levels reflecting projected population growth, the total expenditure would be $73.97 billion in 1990 dollars. The estimated total of $79.25 billions for Concept 1, spread, is 7% greater than this extrapolated total, a relatively small increase attributable to assumed increased standards in this study.

- **roads**, for which Spread has the highest cost at $19.9 billion and Central has the lowest cost of $13.2 billion, with Nodal in between at $17.0 billion;

- **transit**, for which Central has the highest capital cost at $14.4 billion and Spread the lowest capital cost at $7.2 billion, with Nodal again intermediate at $11.6 billion;

- **local services/roads**, for which Spread has the highest capital cost at $15.8 billion, Central has the lowest capital cost at $9.0 billion, and Nodal is intermediate at $11.0 billion; and

- **passive open space**, for which Central has the highest capital cost at $1.1-$6.0 billion, Spread has the lowest capital cost at $1.1 billion, and Nodal is also quite high at $1.1-$4.7 billion. As noted earlier, these capital costs would all be equal (at $1.1 billion) if lower accessibility standards to passive open space were assumed for Concept 2 (and, to a lesser extent, Concept 3) relative to Concept 1.

In all four cases, Concept 3, Nodal, has an intermediate cost between that of the other two concepts. Most of the other subcomponents have costs which are quite similar across the three concepts, except for educational facilities, for which Spread has the highest capital cost at $6.4 billion and Central has the lowest at $4.2 billion, reflecting efficient use of inner city schools which are currently under-utilized. A reverse trend is evident for the land cost of urban parks, however, since Central has the highest estimated cost at $4.22 billion, with Spread lowest at $2.32 billion and Nodal also quite low at $2.82 billion.

Existing and Projected Annual Expenditures

It is useful to consider how the projected future capital cost expenditures shown in Exhibit 7 compare with actual rates of expenditure over the past few years. This comparison is shown in Exhibit 8 which lists actual average annual capital expenditures for the period 1984-88 (as compiled by the office for the Greater Toronto Area) and adjusted to 1990 dollars by the study team, with the average annual expenditures projected for the period 1990-2021 for each of the three concepts as derived from this study. It should be stressed that we did not have the opportunity to check the 1984-88 totals in terms of consistency with the infrastructure elements included in the 1990-2021 projections; there was an evident difference

EXHIBIT 8

SUMMARY OF AVERAGE ANNUAL CAPITAL COSTS

(BILLIONS OF 1990 DOLLARS)

	1984-1988 ACTUAL	1990-2021 PROJECTED		
		1. SPREAD	2. CENTRAL	3. NODAL
TRANSPORTATION	1.78	0.87	0.89	0.92
HARD SERVICES		0.63	0.41	0.47
GREENING/ENVIRONMENT		0.10	0.26	0.22
HUMAN SERVICES		0.95	0.98	0.93
TOTAL	1.78	2.55	2.54	2.54

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NOTES:

- Annual costs in this table are derived from the 31 year totals in Exhibit 7 by dividing the upper end of the total cost range in Exhibit 7 by 31.
- 1984-88 actual costs are based on OGTA inventory of GTA provincial and municipal capital expenditures for the five year period 1984-88, adjusted to 1990 dollars. All categories are combined because of allocation differences among the categories.
- If the annual 1984-88 expenditures above (and in Exhibit 9) are extrapolated for the period 1990-2021 at expanded levels reflecting projected population growth, the total expenditures would be $73.97 billion in 1990 dollars. This is 7% lower than the total derived for Concept 1, Spread (see Exhibit 7). This relatively small difference is attributable to assumed increases in standards in the derivation of the costs for all three concepts.

in the allocation of investment among the components so all were combined for this exhibit.

The comparison suggests that the recent annual capital cost expenditure level of about $1.78 billion would have to increase about 42% to about $2.5-2.6 billion per year (assuming the upper end of the total capital cost estimate ranges) in order to provide the necessary infrastructure for the three urban structure concepts, as derived in this study. By way of comparison, the OGTA canvassed the relevant provincial ministries and municipalities for their anticipated capital expenditures over the period 1989-1993 and the average annual expenditure which emerged from this exercise was about $2.0 billion per year (for the same infrastructure components as shown in Exhibit 8 for the 1984-88 actual expenditures and also in 1990 dollars), a level about 20% lower than that estimated by this study but higher than the average annual expenditures during 1984-88.

Annual Per Capita Expenditures

It is also useful to compare the future rate of capital investment in infrastructure with that of the recent past on a per capita basis. This is done in Exhibit 9, which shows that recent infrastructure investment levels of about $476 per capita would have to increase to about $510 per capita for each of the three concepts (assuming the high end of the cost range for Concepts 2 and 3). These results suggest that, on a per capita basis, the average annual capital investment in GTA infrastructure would have to increase by about 7% to achieve any of the three concepts at the service levels described in this study.

The general conclusion is that future capital expenditures on a per capita basis would have to be about 7% greater per year than recent annual levels of government expenditures if infrastructure deficiencies are to be overcome and new growth accommodated during the coming 31 years, under all three concepts. There are significant trade-offs between the level of service (quality standards) provided and the required level of infrastructure investments, which are addressed at the end of this section.

Comparison Highlights: Costs to 2021

Capital cost comparisons for the period 1990-2021, as described above, are highlighted in Exhibit 10A, which shows the cumulative investment totals for the four major infrastructure components (transportation, hard services, greening/environment and human services) as well as the totals; also shown are the average annual investment levels and the average annual per capita investment levels for each of the three concepts, in comparison with recent investment levels. As noted, the major capital cost components are human

EXHIBIT 9

SUMMARY OF AVERAGE ANNUAL CAPITAL COSTS PER CAPITA

(1990 DOLLARS)

	1984-1988 ACTUAL	1990-2021 PROJECTED		
		1. SPREAD	2. CENTRAL	3. NODAL
TRANSPORTATION	476	174	178	184
HARD SERVICES		126	82	94
GREENING/ENVIRONMENT		20	52	44
HUMAN SERVICES		190	196	186
TOTAL	476	510	508	508

NOTES:

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- Annual per capita costs in this table are derived from the annual costs in Exhibit 8 by dividing the actuals by the 1986 population and those of the three concepts by the average population between 1990 and 2021.
- 1984-88 actual totals are based on OGTA inventory of GTA provincial and municipal capital expenditures for the five year period 1984-88, adjusted to 1990 dollars. All categories are combined because of allocation differences among the categories.
- If the annual 1984-88 expenditures above (and in Exhibit 8) are extrapolated for the period 1990-2021 at expanded levels reflecting projected population growth, the total expenditures would be $73.97 billion in 1990 dollars. This is 7% lower than the total derived for Concept 1, Spread (see Exhibit 7). This relatively small difference is attributable to assumed increases in standards in the derivation of the costs for all three concepts.

EXHIBIT 10A

CAPITAL COSTS TO 2021: COMPARISON HIGHLIGHTS

($1990 BILLIONS: 1990-2021 TOTAL)

	1. SPREAD	2. CENTRAL	3. NODAL
TRANSPORTATION COSTS SIMILAR:	27.1	27.6	28.6
HARD SERVICES VARY MOST:	19.5	12.7	14.7
GREENING/ENV. REVERSE TREND:	3.1	3.1-8.0	3.1-6.7
HUMAN SERVICES MAJOR ITEM:	29.6	30.4	28.8
TOTAL CAPITAL COSTS SIMILAR	79.3	73.8-78.7	75.2-78.8
AVERAGE ANNUAL COSTS ABOUT 42% HIGHER THAN 1984-88 LEVEL OF $1.78 BILLION	2.6	2.5	2.5
ANNUAL PER CAPITA CAPITAL COSTS ABOUT 7% HIGHER THAN 1984-88 LEVEL OF $476	510	508	508
MAJOR HIGHLIGHT: CAPITAL COSTS ARE LARGE BUT COST DIFFERENCES AMONG CONCEPTS ARE INSIGNIFICANT AND ESTIMATED FUTURE ANNUAL COSTS PER CAPITA ARE ONLY 7% HIGHER THAN RECENT LEVELS			

NOTES:

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- Upper end of cost range reflects theoretical cost of acquiring passive open space in urbanized area of each concept to maintain existing space standards. Lower end of cost range assumes 2,200 acres of new passive open space are acquired under each concept, within the urbanized area of Concept 1.
- Average annual costs and annual per capita costs are based on the upper end of the total cost ranges.

services, which is about 36-39% of the total required investment, and transportation, which is about 34-36%. Hard services is next at 16-25% of the total, and greening/environment is lowest at about 4-10% of the total.

In summary, there are three main conclusions from the capital cost comparisons:

- capital cost differences among the three concepts are insignificant compared to the magnitude of the investments, and are well within the uncertainty range of the cost estimates, which is approximately -10% to +30%, in keeping with the conceptual nature of the infrastructure analyses;

- the overall capital investments required are large, in the order of $79 billion over the 31 year period (including normal contingency margins of +15% to 25%); and

- on an annual basis, these investments are approximately 42% larger than recent rates of infrastructure investment in the GTA and on an annual per capita basis they are about 7% greater. These increases, expressed in constant 1990 dollars, reflect the need to make up infrastructure deficiencies which have accumulated during the past decade and the major investments which will be required to maintain service standards at recent levels in the light of substantial continuing growth.

Comparison Highlights: Costs to 2011

Estimated cumulative capital expenditures for the period 1990-2011 are summarized in Exhibit 10B, in the same format as Exhibit 10A. These estimates were derived by prorating the cumulative 1990-2021 estimates on a linear basis in terms of the numbers of elapsed years (that is, multiplying them by the fraction 21/31). In the absence of more detailed planning and staging studies, this broad approach to estimating intermediate investment levels is the most practical and realistic approach, in the view of the consultant team. While the investment amounts are smaller to 2011, the percentage allocations and estimated percent increase in annual average investment levels are the same as in Exhibit 10A. However, our assumption of equal annual investments over the 31 years, reflecting higher per capita "catch-up" expenditures early in the period, leads to a higher average per capita annual expenditure in the 21 year period 1990-2011 than for the 31 year period to 2021, as is evident by comparing Exhibit 10B with Exhibit 10A.

EXHIBIT 10B

CAPITAL COSTS TO 2011: COMPARISON HIGHLIGHTS

($1990 BILLIONS: 1990-2011 TOTAL)

	1. SPREAD	2. CENTRAL	3. NODAL
TRANSPORTATION COSTS SIMILAR:	18.6	18.4	18.9
HARD SERVICES VARY MOST:	13.6	8.4	10.0
GREENING/ENV. REVERSE TREND:	2.2	2.2-5.2	2.2-4.7
HUMAN SERVICES MAJOR ITEM:	20.2	20.5	18.9
TOTAL CAPITAL COSTS SIMILAR:	54.6	49.5-52.5	50.0-52.5
AVERAGE ANNUAL COSTS ABOUT 42% HIGHER THAN 1984-88 LEVEL OF $1.78 BILLION	2.6	2.5	2.5
ANNUAL PER CAPITA CAPITAL COSTS ABOUT 13% HIGHER THAN 1984-88 LEVEL OF $476	553	532	532

MAJOR HIGHLIGHT: CAPITAL COSTS ARE LARGE BUT COST DIFFERENCES AMONG CONCEPTS ARE INSIGNIFICANT AND ESTIMATED FUTURE ANNUAL COSTS PER CAPITA ARE ONLY 13% HIGHER THAN RECENT LEVELS

NOTES:

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- The assumption of equal annual investments over the 31 years, reflecting higher per capita "catch-up" expenditures early in the period, leads to a higher average per capita annual expenditure in the 21 year period 1990-2011 than for the 31 year period to 2021, as is evident by comparing Exhibit 10B with Exhibit 10A.
- See also notes on Exhibit 10A, which apply as well to this exhibit.

Operating Costs

Cost Categories for Which Quantified Estimates Were Produced

Following suggestions by the consultant team, it was agreed with the Committee that quantified estimates of operating costs in the year 2021 for each concept would be provided for the following:

- transportation
  - roads departments;
  - automobile travellers' costs;
  - transit properties;
  - school busing;
  - handicapped transit services.
- hard services
  - solid waste disposal.

It was also agreed that qualitative comments on operating costs and possible capital/operating cost trade-offs would be provided for the various human services (health, education, culture/recreation, social services, protection services) and regarding differences in water pumping costs among the three concepts.

Comparison Highlights: Operating Costs

Highlights of the quantitative operating cost estimates are shown in Exhibit 11. As can be seen, the major subcomponent of transportation operating costs is automobile travellers' operating and ownership costs. In order to avoid double counting, fuel taxes have been subtracted from these costs, just as transit fare revenues have been subtracted from the operating costs of the transit systems. The auto travellers' costs, expressed on an annual basis for the year 2021, are estimated at about $10.2 billion for Concept 1, Spread, $8.0 billion for Concept 2, Central, and $9.2 billion for Concept 3, Nodal. The total transportation operating costs range from $12.0 billion for Spread to $9.9 billion for Central and $11.1 billion for Nodal. It can be seen that auto travellers' costs range from about 88% of the total in the Central concept to about 85% of the total in the Spread concept.

Qualitative Comments on Other Operating Costs

Qualitative comments on the relative efficiencies of service delivery and accessibility for the various human services are implicit in the concept ratings summarized in this report, and are described in more detail in Background Reports Nos. 6 and 7. Background Report No. 4 provides a brief commentary on water pumping cost

EXHIBIT 11

OPERATING COSTS: COMPARISON HIGHLIGHTS

(ANNUAL COSTS IN 2021, IN BILLIONS OF 1990 DOLLARS)

	1. SPREAD	2. CENTRAL	3. NODAL
TRANSPORTATION			
ROADS DEPARTMENTS	0.24	0.21	0.23
AUTO TRAVELLER COSTS	10.15	7.98	9.15
TRANSIT PROPERTIES	1.13	1.37	1.32
SCHOOL BUSING	0.27	0.17	0.22
HANDICAPPED TRANSIT	0.17	0.14	0.17
SUB-TOTAL	11.96	9.87	11.09
HARD SERVICES			
SOLID WASTE DISPOSAL	1.00	1.00	1.00
TOTAL OPERATING COSTS QUANTIFIED IN THIS STUDY	12.96	10.87	12.09

NOTE:

- Other operating costs (eg. human services, etc.) not quantified.

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differences. Quantitative estimates of these operating costs were not attempted in this study for the reasons outlined earlier.

Urban Structure

Several aspects of the urban structure comparison are highlighted in this section, including population density levels, land consumption, and the various comparison measures described in Chapter 2.

Population Densities

A summary of population densities in various parts of the GTA and for the total GTA is provided in Exhibit 12. This exhibit presents the 1986 densities and the postulated 2021 densities for each of the three urban structure concepts, for the five regional municipalities making up the GTA, for the five largest area municipalities, and for the GTA as a whole.

Perhaps the most significant highlight from this set of numbers is the observation that Concept 2, Central, would have a population density in 2021 very similar to that of the City of Toronto in 1986 and less than the City's projected 2021 population density under Concept 1, Spread. Under Concept 2, the City's density would increase to about 50 persons per acre, which is similar to that in the central cities of a large number of metropolitan areas in various countries, as discussed in Background Report No. 1. The Cities of North York and Scarborough would have densities under Concept 2 which are only slightly less than the current density of the City of Toronto. The GTA as a whole would have a population density under Concept 2 which is slightly less than the current density of Metropolitan Toronto.

The gross population density of Metro Toronto under Concept 2 would be about 30 persons per acre (12 per ha) in 2021, which is very close to the current population density of the City of Toronto, 29.1 persons per acre (11.8 per ha). The overall density of the GTA under Concept 2 in 2021 would be about 16 persons per acre (6.5 per ha), quite similar to that currently experienced in Metro Toronto (17.5 persons per acre or 7.1 per ha). For comparison, the gross population density in Metro Toronto would be about 22 persons per acre (8.9 per ha) in 2021 under Concept 3 and the density of the entire GTA would be about 15 persons per acre (6.1 per ha) under this concept. Under Concept 1, the gross population density in Metro Toronto would be about 19 persons per acre (7.7 per ha) in 2021 and the density of the entire GTA would be about 13 persons per acre (5.3 per ha). Gross population density, as presented in the above examples, is defined as total population divided by gross residential acres (including streets, parks, schools, etc.) in the jurisdiction.

EXHIBIT 12

POPULATION DENSITY SUMMARY

(POPULATION PER GROSS RESIDENTIAL ACRE)

	1986	2021		
		1. SPREAD	2. CENTRAL	3. NODAL
REGIONAL MUNICIPALITIES				
DURHAM	8.7	9.9	9.0	10.2
HALTON	7.9	8.8	8.2	10.5
METRO	17.5	19.4	30.4	22.4
PEEL	11.5	12.3	11.8	13.9
YORK	8.5	9.2	8.8	10.7
SELECTED AREA MUNICIPALITIES				
TORONTO	29.1	32.2	50.1	37.1
NORTH YORK	15.2	16.9	27.0	19.5
SCARBOROUGH	14.1	16.2	28.7	18.7
ETOBICOKE	13.1	14.1	19.7	16.2
MISSISSAUGA	11.5	12.8	12.0	14.7
GTA TOTAL	12.9	12.6	16.9	14.9

NOTE:

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- Incremental development densities on new land in the four suburban regions are assumed to be in the range 6-20 persons/acre in Concepts 1 and 2 and 15-30 persons/acre in Concept 3. Redevelopment densities in Metro are 240-300 persons/acre in all three concepts. Average densities shown in the above table show much smaller differences among the three concepts because they include the influence of existing development densities which are, of course, the same in all three concepts. Average suburban densities are lower in Concept 2 than in Concept 1 for this reason: there is much less population growth in the suburbs under Concept 2 (at higher incremental densities) so the increase in average density is less in Concept 2 in the four suburban regions than it is in Concept 1.

The point being highlighted is that we have current examples of the average population density which would be experienced for Metro Toronto for Concept 2 (e.g. the City of Toronto) and for the GTA under Concept 2 (e.g. Metro Toronto) and these examples suggest that the central densities implied by Concept 2 would likely be acceptable to a substantial number of people, such as those who currently live in the City of Toronto. The population density for the GTA under Concept 1, Spread, would be essentially the same as that in 1986 while the GTA density for Concept 3, Nodal, would be intermediate but closer to that of Concept 2.

New Urbanized Land

As summarized in Exhibit 13, there would be significant differences in the amount of new (rural) land urbanized between 1986 and 2021 under the three concepts. In 1986 the urbanized area of the GTA was about 590 sq.miles (1,520 km^2) or about 21% of the total GTA land area. Under Concept 1, Spread, an additional 350 sq.miles (900 km^2) would be urbanized, while the new urbanized land would be about 140 sq.miles (350 km^2) under Concept 2 and about 230 sq.miles (590 km^2) under Concept 3. This means that the urbanized area would be about 34% of the entire GTA by 2021 under the Spread Concept, about 26% under the Central Concept and about 29% under the Nodal Concept. Some 213 sq.miles (552 km^2) of Class 1, 2 and 3 agricultural land would be consumed by Concept 1, Spread, some 45 sq.miles (117 km^2) by Concept 2, Central and some 112 sq.miles (290 km^2) under Concept 3, Nodal.

Comparison Highlights

Concept comparison highlights under the urban structure criterion are summarized in Exhibit 14. In addition to highlighting the population density and land consumption figures noted above, this exhibit also summarizes the ratings under the five comparison measures relating to the urban structure criterion. In general, the Nodal Concept received higher ratings for these measures, followed closely by the Central Concept.

Economic Impetus

The concept comparison ratings for the five measures under this criterion are highlighted in Exhibit 15, along with relevant quantitative measures.

Factors Affecting Land Prices

Two factors affecting land prices and therefore affecting future economic growth are illustrated in Exhibit 15 and discussed more fully in Background Report No. 7. The premise is that economic growth will tend to be slowed if prices of serviced land for urban development or redevelopment rise substantially, thereby increasing the average prices of housing and employment facilities. It is suggested that there are two basic forces which could lead to increased prices for serviced land, housing, etc:

EXHIBIT 13

GTA URBANIZED LAND AREA SUMMARY

GTA TOTAL AREA: 7,200 KM^2

URBANIZED AREA 1988: 1,520 KM^2

PERCENT URBANIZED 1986: 21%

	1. SPREAD	2. CENTRAL	3. NODAL
ADDITIONAL URBANIZED LAND 1988-2021 (KM^2)	900	350	590
URBANIZED AREA 2021 (KM^2)	2,420	1,870	2,110
PERCENT URBANIZED 2021:	34%	26%	29%

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EXHIBIT 14

URBAN STRUCTURE: COMPARISON HIGHLIGHTS

	1986	2021		
		1. SPREAD	2. CENTRAL	3. NODAL
GROSS POPULATION DENSITIES WITHIN FAMILIAR RANGE (PPA):				
CITY OF TORONTO	29	32	50	37
REST OF METRO	14	16	26	19
METRO TORONTO	18	19	30	22
4 SUBURBAN REGIONS	9	9	9	12
TOTAL GTA	13	13	17	15
WIDE VARIATION IN RURAL LAND CONSUMED FOR URBANIZATION (KM^2)	1,520	+ 900 = 2,420	+ 350 = 1,870	+ 590 = 2,110
URBANIZED PERCENT OF TOTAL GTA LAND ALSO VARIES SIGNIFICANTLY	21%	34%	26%	29%
GROWTH IMPACTS ON EXISTING COMMUNITY CHARACTER DIFFER, BUT SIMILAR OVERALL WITH NODAL HAVING A SLIGHTLY LOWER IMPACT		◐	◐	◔
NODAL GIVES WIDER RANGE OF COMMUNITY SIZES		○	◐	◕
NODAL ALSO LIKELY TO PROVIDE BROADER RANGE OF COMMUNITY DIVERSITY IN HOUSING TYPES/OWNERSHIP, DENSITIES AND MIX OF RESIDENTIAL/JOB ACTIVITIES		◐	◐	●
CENTRAL BUILDS MOST EFFICIENTLY ON EXISTING URBAN INFRASTRUCTURE		◕	◔	◑
CENTRAL GIVES GREATEST REGIONAL/ COMMUNITY BALANCE OF PEOPLE AND JOBS, FOLLOWED CLOSELY BY NODAL		○	●	◔

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LEGEND: Relative Rating Symbols

- High Rating ●
- Medium-High Rating ◕
- Medium Rating ◐
- Medium-Low Rating ◴
- Low Rating ○

EXHIBIT 15

ECONOMIC IMPETUS: COMPARISON HIGHLIGHTS

	2021		
	1. SPREAD	2. CENTRAL	3. NODAL
SPREAD INVOLVES LEAST RISK OF LAND SUPPLY/DEMAND IMBALANCE AND RESULTING HOUSING PRICE INCREASES	◕	◔	◐
CENTRAL HAS LOWEST LAND DEVELOPMENT COSTS PER NEW RESIDENT AND THEREFORE LOWEST LIKELY COST PUSH ON HOUSING PRICES	$3,000-4,000 ○	$1,000-1,500 ●	$2,000-3,000 ◐
CENTRAL HAS LOWEST CONSUMPTION OF AGRICULTURAL LAND (KM^2) FOLLOWED CLOSELY BY NODAL	545 ○	115 ◔	285 ◐
CENTRAL HAS LOWEST CONSUMPTION OF FOREST RESOURCES LANDS (KM^2)	69 ◕	38 ◔	51 ◐
CENTRAL HAS LOWEST CONSUMPTION OF MINERAL RESOURCES LANDS (KM^2)	33 ◕	8 ◔	20 ◐

LEGEND: Relative Rating Symbols

- High Rating ●
- Medium-High Rating ◕
- Medium Rating ◐
- Medium-Low Rating ◔
- Low Rating ○

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1. Restrictions on the rate at which serviced land is delivered to the market, thereby creating a supply/demand imbalance and leading to price increases;

2. High costs of preparing the land for development/redevelopment and providing local services/roads/utilities, which would drive up the prices of housing and other buildings even if an appropriate supply/demand balance were maintained.

Supply-Demand Imbalance of Serviced Land

As pointed out in Exhibit 15, the three concepts are rated quite differently in terms of these two measures: Concept 1 is given a **medium-high** rating in terms of having a low risk of supply/demand imbalance and resulting housing price increases, because this concept would involve the lowest level of government regulation; conversely, Concept 2, Central is given a **medium-low** rating in terms of this measure because more government regulation would be required to achieve the major redistribution of growth under this concept with a resulting increased risk of a supply/demand imbalance if, for example, new land for redevelopment in central areas are not delivered quickly enough to meet the increased demand. It is, of course, by no means certain that Concept 1 would perform better in terms of land supply/demand balance than would Concept 2; there have been times when the ability of the existing planning, servicing and approval process to deliver serviced suburban land may have lagged behind rapid growth in the GTA and thereby contributed to significant housing price increase on a number of occasions over the past three decades, including the past six years. Nevertheless, it is felt that the risk of a supply/demand imbalance would possibly be higher under Concept 2, Central, since the process of increasing the supply of central area land for redevelopment at the same time as the rate of delivery of new suburban land is decreased would require very careful management by the governments involved. Concept 3, Nodal, would also require an increased level of government regulation to achieve the more compact, nodal development, but the level of regulation and the risk of a land delivery supply/demand imbalance would be less under Concept 3 than under Concept 2, in the view of the consultant team, and this concept is therefore rated **medium**.

Cost Push on Land Prices

The other major factor affecting prices of serviced land is the cost of land development and redevelopment, including local hard services/utilities. A concept has a **high** rating under this measure if it has a low consumption of new land for development, which helps to reduce per capita land development costs and thereby to moderate price increases for land, housing and employment facilities. Concept 1, Spread has a **low** rating since most of the residential

development and much of the employment development would take place on new land, with relatively high per capita land development costs ($3,000-$4,000 per new resident) because of the low densities involved. Concept 2, Central, is given a **high** rating because it would have relatively low land development costs ($1,000-$1,500 per new resident) due to less consumption of new land at low densities and more redevelopment at higher densities. Concept 3, Nodal, is given a **medium** because it would have intermediate levels of land consumption, densities and land development costs ($2,000-$3,000 per new resident). As described more fully in Background Report No. 7, land development costs for new land are estimated at $70,000 per acre for residential land and $50,000 per acre for industrial land, while comparable costs for redeveloped land are estimated at $300,000 per acre.

Other Economic Measures

In terms of the other measures under the economic impetus criterion, which relate primarily to the loss of land devoted to agricultural, forest products and mineral resources economic activities, it can be seen that, as would be expected, Concept 2, Central receives the highest rating because of its lower consumption of new land for urbanization, Concept 2. Spread, has the lowest rating and Concept 3, Nodal has an intermediate rating in terms of land consumption in these categories.

Transportation

Concept comparison highlights under the transportation criterion are presented in Exhibit 16, which summarizes the concept ratings for each of the 12 measures under this criterion and relevant quantitative estimates.

Comparison Highlights: Transportation

In general, it can be seen that Concept 1, Spread, receives the highest ratings in terms of having an extensive road transportation network, good intercity connections, and effective access to rural areas. Concept 2, Central, receives the highest rating for having the most extensive transit network, the lowest travel effort (in terms of average trip time, trip distance and trip cost, etc.), the lowest level of inter-regional (cross-boundary) travel, the highest level of transit cost-efficiency, the lowest school busing costs, the best opportunities for providing transit for mobility-handicapped persons, the lowest capital costs, and the lowest operating costs. Concept 3, Nodal, generally receives intermediate ratings in terms of most of the transportation measures, often close to the rating of the most favoured concept.

EXHIBIT 16

TRANSPORTATION: COMPARISON HIGHLIGHTS

(SIMULATED FOR A.M. PEAK PERIOD: 6:00-9:00 A.M.)

	1986	2021		
		1. SPREAD	2. CENTRAL	3. NODAL
CENTRAL HAS HIGHEST LEVEL OF RAIL TRANSIT SERVICE:		○	●	◐
- IMPROVED COMMUTER RAIL (KM)		410	360	410
- NEW RAPID TRANSIT (KM)		81	178	181
- SERVICE FREQUENCY		Lowest	Highest	High
SPREAD HAS LARGEST ROAD NETWORK:		●	○	◐
- NEW FREEWAYS (LANE-KM)		2,035	784	1,024
- NEW ARTERIALS (LANE-KM)		5,237	3,908	5,472
SPREAD HAS SLIGHTLY BETTER INTERCITY CONNECTIONS FOR TRAVELLERS AND GOODS		◕	◐	◐
SPREAD HAS BETTER ACCESS TO RURAL AREAS		◕	◔	◐
CENTRAL HAS LOWEST TRAVEL EFFORT:		○	●	◐
- AVERAGE TRIP TIME (MINUTES)	27.4	27.5	24.7	26.5
- AVERAGE TRIP DISTANCE (KM)	13.4	15.0	13.2	14.4
- AVERAGE TRIP COST ($)		3.15	2.70	2.99
- PERSON-HOURS OF TRAVEL (MILLIONS)	0.244	0.385	0.368	0.381
- PERSON-KM OF TRAVEL (MILLIONS)	9.11	16.99	14.42	16.11
CENTRAL HAS LOWEST CROSS-BOUNDARY TRIPS:		○	●	◐
- INTRA-REGIONAL	76%	70%	78%	73%
- 4 REGIONS TO METRO	14%	17%	10%	15%
- METRO TO 4 REGIONS	7%	7%	9%	8%
- AMONG 4 REGIONS	3%	5%	3%	4%
CENTRAL HAS HIGHEST TRANSIT COST-EFFICIENCY		○	●	◐
COSTING ASSUMES SUFFICIENT ROAD NETWORK EXPANSION TO ACHIEVE EQUAL LEVELS OF ROAD CONGESTION		◐	◐	◐

LEGEND: Relative Rating Symbols

- High Rating ●
- Medium-High Rating ◕
- Medium Rating ◐
- Medium-Low Rating ◔
- Low Rating ○

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EXHIBIT 16 (CONT'D)

TRANSPORTATION: COMPARISON HIGHLIGHTS

(SIMULATED FOR A.M. PEAK PERIOD: 6:00-9:00 A.M.)

	1986	2021		
		1. SPREAD	2. CENTRAL	3. NODAL
CENTRAL HAS LOWEST SCHOOL BUSING COSTS:		○	●	◐
- ANNUAL 2021 OPERATING COSTS ($1990 BILLION)	0.15	0.27	0.17	0.22
CENTRAL HAS BEST HANDICAPPED TRANSIT OPPORTUNITIES		◐	●	◔
- ANNUAL 2021 OPERATING COSTS ($1990 BILLION)	0.02	0.17	0.14	0.22
CAPITAL COSTS ARE SIMILAR:		◐	◐	◐
- ROADS ($1990 BILLIONS OVER PERIOD 1990-2021)		19.9	13.2	17.0
- TRANSIT ($1990 BILLIONS OVER PERIOD 1990-2021)		7.2	14.4	11.6
- TOTAL ($1990 BILLIONS OVER PERIOD 1990-2021)		27.1	27.6	28.6
CENTRAL HAS LOWER ANNUAL OPERATING COSTS:		○	●	◐
- ROADS NETWORK AND AUTO COSTS ($1990B IN 2021)	5.7	10.4	8.2	9.4
- TRANSIT SYSTEM ($1990B IN 2021)	0.7	1.1	1.4	1.3
- TOTAL ($1990B IN 2021)	6.4	11.5	9.6	10.7
SIMILAR FEDERAL TRANSPORTATION COSTS*				
- NEW/EXPANDED AIRPORT			(MAJOR INVESTMENT)	
- FREIGHT RAIL LINK, MILTON TO HALWEST		0.7	0.7	0.7

NOTE:

* Not rated: Related Provincial/Municipal costs are similar across all three concepts and are broadly included in cost totals but Federal costs are not included in the totals.

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LEGEND: Relative Rating Symbols

High Rating	●
Medium-High Rating	◔
Medium Rating	◐
Medium-Low Rating	◴
Low Rating	○

Estimated Road Capacity Increases/Costs to Achieve Equal Levels of Service

As noted in Background Report No. 3, the transportation demand and sizing analysis produced estimates of the number of lane-km of major roads and arterial roads which would be required to achieve similar peak period travel speeds (generally at level of service E as defined by the highway capacity manual) as were experienced in 1986. The assumption made in order to compare the concepts was that all of the required lane-km of new and widened roads would be added as required to achieve the level of services. This is reflected in the transportation capital cost and operating cost estimates and implies that all three concepts would experience 1986 road travel speeds (i.e. an equal level of service in terms of congestion levels).

All three concepts are therefore given a medium rating under this measure, since all would have the same level of road traffic congestion. It should be pointed out, however, that in order to achieve such parity of road traffic service levels, Concept 1, Spread, would require the addition of some 19 lanes of urban arterial roads into the central area of Toronto to carry estimated inbound auto traffic demands in the a.m. peak hour in 2021, while Concept 3, Nodal, would require an additional 13 inbound lanes and Concept 2, Central, would function without any additional lanes of radial roadway in the central areas. These differences, as well as extensive differences in the lane-km of new roads required to serve suburban areas under the three concepts, are reflected in the estimated capital costs for roads under each of the three concepts.

To the extent that it would be impractical to add such a substantial number of new roads in the central areas under Concept 1 and even under Concept 3, there could be a greater tendency for traffic congestion to increase in central areas under these concepts than under Concept 2. This, in turn, could lead to increased economic costs from the resulting traffic congestion which could act to retard economic growth and would probably force other transportation investments or result in caps being placed on further population and employment growth. It was felt that the most direct way of estimating and illustrating these differences among the three concepts would be to identify the differing capital costs to supply the required additional roads to provide an equal level of service under each concept.

The approach taken is logical in economic terms as a means of comparing the three concepts regarding road system requirements. It is by no means certain, however, that the additional lane-km of roads could physically be added in central areas at the level postulated for Concept 1, or possibly at the lower level postulated for Concept 3. Therefore, while this comparison is valid at the conceptual level, its

validity at the practical level would require more detailed planning studies which are beyond the scope of the current, conceptual study. The practicality of Concept 1, Spread, is therefore thrown into question under this measure to a substantially greater degree than that of Concept 3, while Concept 2 does not suffer from this problem. In practice, fewer new lanes of roads in central areas would likely be added under Concepts 1 and possibly 3 than are identified in this study, reflecting the space limitations and disruptions of such extensive road additions. Congestion levels would therefore increase unless other steps, such as growth limitations or provision of more transit, were taken. The economic costs of such steps are reflected for purposes of this comparison in the substantially higher road capital costs estimated for Concept 1 and, to a lesser extent, Concept 3.

Net Present Value of Transportation Capital and Operating Costs

Because of the importance of transportation costs, both capital and operating, in contributing to the total costs of each concept, it is useful to express the stream of expenditures over the 31 year period from 1990 to 2021 on a Net Present Value (NPV) basis for both sets of costs (capital and operating). This was done assuming a discount rate of 7% per annum. On this basis, the net present value in 1990 of the stream of transportation capital expenditures would be $10.2% billion for Concept 1, Spread, $10.4 billion for Concept 2, Central and $10.8 billion for Concept 3, Nodal. The net present value of the transportation operating costs in 1990 would be $103.9 billion for Concept 1, $93.4 billion for Concept 2, and $99.5 billion for Concept 3. Taking the combined net present value of both capital and operating costs in 1990, we have $114.1 billion for Spread, $103.8 billion for Central and $110.3 billion for Nodal. Again, the differences among these values are small relative to the absolute values, in the order of $\pm$5%. The point illustrated is that operating costs are very significant relative to capital costs, and the approximately $2 billion difference in annual operating costs between Concept 1 and Concept 2 should be taken into account when assessing the cost aspects of the very concepts. As noted earlier, however, 80-85% of transportation operating costs are borne by the private sector (automobile drivers) so that the additional $2 billion per year to operate Concept 1 relative to Concept 2 would be less significant in public sector terms than the numbers would suggest. The operating cost differences are worth noting, however, regardless of who pays them.

Transportation Ratings Summary

In overall terms, Concept 2, Central, tended to receive higher ratings under the transportation criterion, followed fairly closely by Concept 3, Nodal, with Concept 1, Spread having the lowest ratings except for the three measures referred to above.

Hard Services

Water and Sanitary Sewerage Systems

The hard services comparisons of the three concepts are highlighted in Exhibit 17. As shown, and as discussed in Chapter 2 earlier, the three concepts are essentially equal in terms of capital costs for trunk water and sanitary sewerage systems and for the costs of solid waste management. As noted, none of the concepts assumes a significant increase in the amount of development north of the Oak Ridges Moraine watershed which would be served by Lake Ontario based water and sewer systems. Increased capital costs would be experienced for any concept in which such development and servicing were to occur.

Land Development/ Redevelopment Local Hard Services

In contrast, significant differences are estimated in the costs for land development/redevelopment, including site preparation, local services/utilities and local roads. Concept 1, Spread, has the highest cost under this measure at $15.8 billion, Concept 2, Central has the lowest cost at $9.0 billion, and Concept 3, Nodal has an intermediate cost at $11.0 billion. This is because, while the cost per acre for redevelopment (as noted earlier a value of $300,000 per acre was used in this study) is substantially higher than the cost per acre for developing new land (values of $70,000 per acre for residential land and $50,000 per acre for industrial land were used) the substantially higher area of new land to be developed under Concept 1 gives it a much higher cost under this measure. It could be argued that, since the land development/redevelopment cost is borne by the developer, this was not a public sector investment and therefore should not be included in the comparison. The study team is of the view, however, that these costs should be included because they are passed directly on to the new resident or employer occupying the premises in terms of purchase or rental prices. There is also an increasing tendency to treat other infrastructure investments in the same manner, through developer levies and special taxes, so that the manner in which local development costs are borne by the developer and thus passed on to the purchaser is becoming more common for other types of urban infrastructures.

EXHIBIT 17

HARD SERVICES: COMPARISON HIGHLIGHTS

	2021		
	1. SPREAD	2. CENTRAL	3. NODAL
EQUAL COSTS FOR TRUNK WATER AND SANITARY SEWERAGE SYSETMS: ($1990 BILLIONS OVER PERIOD 1990-2021)	◐ 3.7	◐ 3.7	◐ 3.7
EQUAL COSTS FOR SOLID WASTE MANAGEMENT: (2021 ANNUAL OPERATING COSTS* IN BILLIONS OF 1990 DOLLARS)	◐	◐	◐
- CENTRALIZED SYSTEM	0.77	0.77	0.77
- DECENTRALIZED SYSTEM	1.00	1.00	1.00
CENTRAL HAS LOWEST COSTS FOR LAND DEVELOPMENT/REDEVELOPMENT LOCAL HARD SERVICES: ($1990 BILLIONS OVER PERIOD 1990-2021)	○ 15.8	● 9.0	◔ 11.0

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NOTE:

* Includes all costs, but considered as operating costs since contracted out.

LEGEND: Relative Rating Symbols

High Rating	●
Medium-High Rating	◕
Medium Rating	◐
Medium-Low Rating	◴
Low Rating	○

Hard Services Ratings Summary

In overall terms, Concept 2, Central, received higher ratings under the hard services criterion (reflecting the above differences in land development/redevelopment costs) with Concept 1, Spread, having the lowest rating and Concept 3, Nodal, having an intermediate rating.

Greening/Environment

Concept comparison highlights for the greening/environment criterion are summarized in Exhibit 18, including the ratings under the seven measures for this criterion and relevant quantitative estimates.

Comparison Highlights: Greening/Environment

It can be seen that Concept 1, Spread, receives the highest ratings under two measures, in that it would have the lowest requirement to acquire a new passive green land within the urban area and it would have the least amount of contaminated soil (from redeveloped areas) to dispose of. Concept 2, Central, is rated highest in terms of its compatibility with the regional green lands concept (e.g. the lowest overlap with passive green areas such as the Lake Ontario shoreline, Oak Ridges Moraine and river/stream valleys), providing the greatest opportunity for clean-up of contaminated soil (because this could be done economically as part of the extensive redevelopment under this concept), having the greatest potential to improve the quality of storm water runoff (because measures to improve runoff quality in central areas can be economically introduced as part of the redevelopment there), producing the least amount of air pollution from transportation (because of the lowest level of automotive use) and having the lowest level of transportation energy consumption (because of shorter and more transit oriented trips). Concept 3, Nodal, has intermediate ratings in all cases, receiving a **medium** rating under seven of the eight measures.

Greening/Environment Ratings Summary

In general, Concept 2, Central, receives higher ratings under the greening/environment criterion, followed by Concept 3, Nodal, with Concept 1, Spread, receiving lower ratings in general, reflecting its greater consumption of resources and more negative environmental impacts.

Human Services

The concept comparisons under the five measures falling within this criterion, and relevant quantitative estimates, are highlighted in Exhibit 19.

Comparison Highlights: Human Services

Concept 1, Spread, receives the highest rating for one of the five measures, cultural/recreation facilities and services, for which it has the same rating as Concept 3, Nodal. Concept 2, Central, receives the highest rating in terms of the effectiveness and efficiency of providing health services and education services. Concept 3, Nodal, receives the highest rating in terms of effectiveness/efficiency of cultural recreation, social services and protection services. These

EXHIBIT 18

GREENING/ENVIRONMENT: COMPARISON HIGHLIGHTS

	1986	2021		
		1. SPREAD	2. CENTRAL	3. NODAL
CENTRAL HAS GREATEST COMPATIBILITY BETWEEN REGIONAL GREENLANDS CONCEPT AND NEW URBANIZED AREA		○	●	◐
- OAK RIDGES MORAINE AREA OVERLAP (KM^2)		90	26	51
- LAKE ONTARIO SHORELINE OVERLAP (KM^2)		16	6	10
SPREAD HAS LOWEST NEED TO ACQUIRE NEW PASSIVE GREEN LAND IN URBAN AREA		●	○	◔
- ADDITIONAL AREA TO ACHIEVE 1.8 HA/1000 (KM^2)		8.9	32.4	30.4
- 1990-2021 LAND ACQUISITION COSTS ($1990B)		1.1	6.0	4.7
- LAND COSTS IF ACQUIRED AS UNDER CONCEPT 1 ($1990B)		1.1	1.1	1.1
SPREAD HAS LEAST CONTAMINATED SOIL PRODUCED		◔	○	◐
- REDEVELOPED AREA (KM^2)		11.1	44.5	19.2
CENTRAL OFFERS GREATEST OPPORTUNITY FOR CLEANUP OF CONTAMINATED SOIL		◔	◔	◐
CENTRAL HAS GREATEST POTENTIAL TO IMPROVE QUALITY OF STORMWATER RUNOFF		◔	◔	◐
CENTRAL HAS LOWEST AIR QUALITY DEGRADATION FROM TRANSPORTATION EMISSIONS		○	●	◐
- KG OF C0, $C0_2$, HC'S, NO_x'S, 2021 A.M. PEAK PERIOD (M)	1.9	5.2	2.6	3.0
CENTRAL HAS LOWEST LEVEL OF TRANSPORTATION ENERGY CONSUMPTION		○	●	◐
- MJ CONSUMED, 2021 A.M. PEAK PERIOD (M)	26.4	46.7	37.2	42.1

LEGEND: Relative Rating Symbols

- High Rating ●
- Medium-High Rating ◔
- Medium Rating ◐
- Medium-Low Rating ◕
- Low Rating ○

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EXHIBIT 19

HUMAN SERVICES: COMPARISON HIGHLIGHTS

	2021		
	1. SPREAD	2. CENTRAL	3. NODAL
CENTRAL PROVIDES HEALTH SERVICES MORE EFFECTIVELY BUT CAPITAL COSTS SIMILAR:	◐	◕	◐
- HOSPITAL CAPITAL COSTS @ 3.5 BEDS/1,000	4.45	5.56	4.75
($1990 BILLIONS, 1990-2021) @ 3.0 BEDS/1,000	3.69	4.65	3.93
CENTRAL PROVIDES EDUCATION FACILITIES/ SERVICES MORE EFFECTIVELY AT LESS CAPITAL COST:	◕	◕	◕
- ELEM. & HIGH SCHOOLS ($1990B OVER 1990-2021)	4.71	2.33	3.01
- COLLEGES & UNIVER. ($1990B OVER 1990-2021)	1.69	1.87	1.78
- TOTAL SCHOOLS ($1990B OVER 1990-2021)	6.40	4.20	4.79
NODAL AND SPREAD PROVIDE CULTURAL/ RECREATION FACILITIES AND SERVICES AT LESS CAPITAL COST:	◕	◐	◕
- CAPITAL COST OF URBAN PARKS ($1990B, 1990-2021)	2.32	4.22	2.82
- GENERAL CULT./REC. ($1990B, 1990-2021)*	10.90	10.90	10.90
- TOTAL CULT./REC. ($1990B, 1990-2021)	13.22	15.12	17.72
NODAL PROVIDES SOCIAL AND OTHER HEALTH SERVICES MORE EFFECTIVELY AND EFFICIENTLY	◕	◐	◕
- CAPITAL COST OF SOCIAL AND OTHER HEALTH SERVICES ($1990B, 1990-2021)*	2.68	2.68	2.68
NODAL PROVIDES PROTECTION SERVICES (FIRE, POLICE, AMBULANCE) MORE EFFECTIVELY AND EFFICIENTLY	◕	◐	◕
- CAPITAL COST OF PROTECTION SERVICES ($1990B, 1990-2021)*	2.83	2.83	2.83

NOTE:

* Cost differentiation among the concepts could not be reliably estimated because of limitations on time and available data.

IBI GROUP

LEGEND: Relative Rating Symbols

High Rating	●
Medium-High Rating	◕
Medium Rating	◐
Medium-Low Rating	◕
Low Rating	○

ratings reflect the opinion of the human services group, and the outside advisors convened for a focus group session during the study, that the nodal urban structure lends itself to efficient and effective provision of human services across the board, exceeded only by the Central Concept in terms of health services (better ability to provide integrated, highly accessible services) and education facilities/services (the Central Concept allows some currently under-utilized inner city schools to be re-used and makes best use of existing colleges and universities to meet future demands).

Human Services Ratings Summary

Accordingly, Concept 3, Nodal, and Concept 2, Spread, generally have higher ratings under the human services criterion and Concept 1, Spread, has lower ratings under this criterion.

External Impacts

The ratings for the two measures under this criterion are highlighted on Exhibit 20.

Comparison Highlights: External Impacts

Generally, Concept 3, Nodal and Concept 2, Central received the highest ratings in terms of low pressure for urban overspill development into the hinterland adjacent to the GTA (because the outer edges of urbanization would remain farther from the GTA boundary), and Concept 3, Nodal, receives the highest rating in terms of less pressure for GTA oriented ex-urban road traffic (because of its low overspill development and relatively high use of transit). Concept 2 has similar attributes in terms of this measure, but receives a lower rating because of the possibility that higher central population densities would create an increased propensity for some urban residents to move out beyond the GTA boundary in order to experience a low density environment.

Impact of Movement to Existing Cities and Towns Outside the GTA

There is also a discussion in Background Report No. 7 of possible differential impacts by the three urban structure concepts on the propensity for GTA residents to move to existing communities beyond the immediate hinterland environs, such as Hamilton, Guelph, Barrie, Peterborough and Cobourg.

As noted in the earlier discussion, relocations to these communities would not have the type of negative impacts associated with overspill rural development and would likely create less pressure for GTA oriented road traffic, since the satellite cities will tend to be connected to the GTA by rail services. Because of this, and because of the difficulties of assessing how the propensity to move to satellite centres might be affected by the three concepts, no attempt was made to rate the concepts in this regard.

EXHIBIT 20

EXTERNAL IMPACTS: COMPARISON HIGHLIGHTS

	2021		
	1. SPREAD	2. CENTRAL	3. NODAL
CENTRAL AND NODAL CREATE LESS PRESSURE FOR URBAN OVERSPILL DEVELOPMENT	○	◐	◐
NODAL CREATES LESS PRESSURE FOR GTA ORIENTED EX-URBAN ROAD TRAFFIC	○	◕	◕

IBI GROUP

LEGEND: Relative Rating Symbols

- High Rating ●
- Medium-High Rating ◕
- Medium Rating ◐
- Medium-Low Rating ◔
- Low Rating ○

4.2 CONCLUSIONS: CONCEPT COMPARISONS

Based on the foregoing, the general conclusions stemming from the concept comparisons are as follows:

- **capital costs** for all three concepts are large, about $74-$79 billion in 1990 dollars, cumulative over the 31 year period 1990-2021, involving a 42% increase over recent annual investment levels, but the capital cost differences among the three concepts are insignificant relative to the uncertainty range of the estimates. All three concepts are therefore rated equally in terms of this measure;

- **operating costs** for solid waste disposal are similar across all three concepts, but there are more significant differences in transportation operating costs, with Concept 1, Spread, having the highest annual transportation operating costs in 2021 ($12.0 billion), Concept 2, Central having the lowest ($9.9 billion) and Concept 3, Nodal having intermediate costs ($11.1 billion) under this measure. Most other operating costs were treated qualitatively owing to study scope and time limitations. Concept 2 is therefore rated highest and Concept 1 lowest under this measure;

- **urban structure**: Concept 3, Nodal, generally receives higher ratings, followed by Concept 2, Central and then by Concept 1, Spread. Concept 2 would consume significantly less rural land for urbanization but Concept 3, Nodal, is seen as superior in terms of having less growth impact on existing community character, providing a wider range of community sizes, and providing a broader range of community diversity in housing types/ownership, densities and mix of residential and job activity;

- **economic impetus**: Concept 2, Central, would have the lowest impact on agriculture, forest products and mineral resource activities in the GTA and would have the lowest cost push impact on land development costs, but could have a higher risk of a land supply/demand imbalance which could lead to price increases for land, housing and employment facilities, depending on the manner in which the required growth management is carried out if this concept were adopted;

- **transportation**: Concept 2, Central, generally receives higher ratings because of shorter trips, greater transit use and generally lower transportation effort, followed rather closely by Concept 3, Nodal in terms of similar measures.

Concept 1, Spread, would be superior in terms of the road network extent and level of service in the suburbs and in terms of intercity connections and access to rural areas, but would have substantially higher levels of transportation effort, (e.g. average trip distance) and operating costs, and a greater possibility of road congestion in central areas because of the practical difficulty of building the necessary roads in build-up areas;

- **hard services**: all three concepts are essentially equal in terms of trunk water and sanitary sewerage systems and solid waste management costs, reflecting the postulated distributions of people and jobs. Concept 2, Central, rates highest in terms of its low land development/redevelopment/ local servicing costs, with Concept 1, Spread having the lowest rating (highest cost) and Concept 3, Nodal, having an intermediate rating closer to that of Concept 2 than Concept 1;

- **greening/environment**: Concept 2, Central, generally has higher ratings under the measures of this criterion, followed fairly closely by Concept 3, Nodal. An exception to this is the high rating of Concept 1, Spread, in terms of its having the lowest need (and cost) to acquire new passive green land in the urbanized area, whereas Concept 1 would have a substantially higher cost in this regard followed by a slightly lower cost for Concept 3 in order to achieve equal levels of passive open space within the urbanized area under each concept. If the alternative approach is taken of providing equal areas of passive open space in the same overall area (e.g. the urbanized areas of Concept 1), all three concepts would have the same capital cost for passive green space but residents would have to travel farther, on average, to experience such space in Concept 2 (and to a lesser extent, in Concept 3) than in Concept 1.

- **human services**: Concept 3, Nodal, and Concept 2, Central generally have higher ratings under this criterion. An exception is the cultural/recreation measure, in which Concept 1, Spread, is rated as high as Concept 3, Nodal because of its relatively low capital cost for urban parks, while Concept 2, Central, is rated lowest in this regard because of the higher requirement and cost for urban parks to serve the higher central population densities under that concept;

- **external impacts**: Concept 3, Nodal, generally receives higher ratings under this criterion since, in common with Concept 2, it is anticipated to create less pressure for GTA overspill (low density) development in the rural hinterland adjacent to the GTA and this, coupled with its higher level of transit service and use in suburban areas, is likely to create less pressure for GTA oriented road traffic in the hinterland.

4.3 CONCLUSIONS: QUALITY/COST TRADE-OFFS

Earlier sections have noted that the substantial capital cost investments required for all three urban structure concepts relate to the level of service (quality standards) assumed in these analyses. Generally, the analyses were based on the assumption that sufficient infrastructure should be provided to achieve a similar level of service to that experienced in 1986 in the GTA, as the "basic" level of service. In addition, in one or two instances, cost estimates were provided (and included) for infrastructure investments to **improve** the level of service provided.

There are four subcomponents of the infrastructure capital cost estimates which are significant in this regard, two of them falling under the transportation criterion and two under the greening/ environment criterion, as follows:

- **transit**: substantial investment levels are estimated for improved transit under all three concepts, particularly Concept 2, Central with an estimate of $14.4 billion. This level of investment (about $460 million per year on average) would be essential in the view of the study team in order to serve the Central Concept and provide an acceptable alternative to the automobile mode, and approximately half that level of investment (about $230 million per year) would be required for improved transit even under the Spread Concept with its emphasis on an extended and improved road network;

- **roads**: the extensive capital investments estimated for new/improved roads ($19.9 billion for Concept 1, $17.0 billion for Concept 3, and $13.2 billion for Concept 2) are based on the premise that additional roads would be built such that equal levels of service would be provided under all three concepts. The cost estimates were based on the assumption that sufficient new lane-km of roads would be added to provide peak period travel speeds similar to those experienced in 1986 throughout the GTA. This subcomponent is the largest single contributor to the

estimated capital costs, comprising about 25% of the estimated total. It is possible that such a level of investment would be considered too high and the alternative of increased road congestion in central and/or suburban areas would be tolerated instead. If this were the case, Concept 2, Central, would experience the least negative impact from such a shortfall while Concept 1, Spread, would have the greatest negative impact and the impact on Concept 3, Nodal, would be intermediate;

- **passive open space**: the initial assumption under this measure was that sufficient passive open space would be purchased **within** the urbanized area under each concept to meet the current standard of 1.8 ha per 1,000 people. It is probable that the significant cost and physical dedication of large land areas to passive open space use in existing urbanized areas ($6.0 billion under Concept 2, $4.7 billion under Concept 3 and $1.1 billion under Concept 1) would be considered to be too high for Concepts 2 and possibly 3, such that lower passive open space standards would be accepted. This could be achieved, as noted earlier, by providing the necessary passive open space in **the same area** (e.g. the urbanized area of Concept 1) for all three concepts. Under this assumption all three concepts would have the same capital cost for passive open space ($1.1 billion) but residents in Concept 2 (and to a lesser extent Concept 3)) would have to travel farther, on average, than would suburban residents in Concept 1, to experience the passive space located in suburban areas.

- **storm water quality**: as described more fully in Background Report No. 5, measures are currently in place to improve the quality of storm water runoff in new suburban areas through measures such as settling ponds. Partial treatment of retained storm water by water pollution treatment plants during off-peak periods is a future possibility. Polluted storm water runoff, sometimes mixed with sanitary sewage because sanitary/storm sewer separation has not been completed, still remains a major problem, however, and severely degrades the quality of GTA river valleys and lakefront amenities. The existing urbanized areas, and particularly the central areas, are increasingly the major problem in this regard. It would be possible to spend very large sums to address this problem but it is difficult to estimate their magnitude and, accordingly, we applied a general estimate of about

$2 billion to all three concepts. Concept 2, Central, would probably provide the greatest opportunity to reduce storm water runoff pollution because retention/treatment facilities could be installed more economically as part of the extensive redevelopment which would occur in central areas under that concept. If it were decided that this level of expenditure could not be maintained to improve the quality of storm water runoff, the greatest loss of opportunity would be experienced under Concept 2, followed in turn by Concept 3 and then Concept 1, but the beaches and river valleys would experience continuing negative impacts under all three concepts.

Clearly, trade-off decisions between levels of capital investments and the resulting functional/environmental standards achieved will require broad input from elected officials, staff, interest groups and the public at large. Increasing concerns regarding environmental quality and required actions to achieve sustainable development in this context will undoubtedly play an important role in this process. The strategic estimates presented here, and the discussion of some basic trade-offs, are intended to facilitate this discussion and consequent decisions.

4.4 SUMMARY: CONCEPT TRADE-OFFS

Emerging from the above ratings and the quantitative projections on which they are based are a number of essential features about each of the three concepts, as follows:

- **Concept 1, Spread:**

  - this concept is the least compatible with sustainable development in that it would consume the greatest amount of rural land and related agricultural productivity and natural resources, would use the most energy and produce the most air pollution because of its higher travel effort and greater reliance on automobiles, and would provide less opportunity to enhance storm-water quality and dispose of toxic soils in central, built-up areas than would be the case for Concept 2 and, to a lesser extent, Concept 3;

  - Concept 1 is, however, closest to the status quo in terms of delivery of new housing, lifestyles, and government planning/regulation affecting urban development.

In some ways, therefore, Concept 1 is the least risky, since it would require less change from the status quo. In the longer term, however, it carries the highest risk since it would place greater negative pressures on the environment and on natural resources including energy sources and agricultural land. The environmental risk relates strongly to recent evidence that transportation activities, and particularly automotive transportation emissions, are contributing significantly to acid precipitation, global warming, ozone depletion at high levels, and local toxic effects in and around urban areas.

- **Concept 2, Central:**

  - this concept makes the most efficient use of resources (e.g. land, energy) and places the least negative load on the environment;

  - however, it would require the greatest amount of government regulation in order to divert population growth from suburban areas to central, built-up areas.

  It would require the greatest change from the status quo in terms of population densities and housing types, less automotive travel and greater use of transit, and growth management policies/programs, with the risks that are inherent in any significant change from the status quo. On the other hand, it would provide the greatest likelihood of achieving sustainable development and avoiding, in the longer term, the apparently inexorable growth of suburban automobile traffic as it is increasingly experienced in large North American cities;

- **Concept 3, Nodal:**

  - this concept builds on existing communities and their urban infrastructure such as civic buildings, commuter rail stations, transportation and other local infrastructure, while providing for continuing growth both in the suburbs and in the central, built-up areas but at higher densities of suburban development than under Concept 1;

  - it would appear to provide the greatest range of choice in terms of population densities and housing types, community size and character, suburban and downtown living styles, available range of

transportation modes, and integrated delivery of human services, while reducing per capita resource requirements and pollution levels relative to Concept 1.

Generally, it would be intermediate between Concepts 1 and 2 regarding its compatibility with sustainable development, the required level of government regulation and other comparison measures, with high rankings in terms of urban amenities, human services and external impacts on the GTA hinterland.

- **Costs:**

  - although minor capital cost savings might be achieved with Concept 2 and, to a lesser extent, Concept 3 relative to Concept 1 (if lower accessibility standards to passive open space were accepted under these concepts) the differences are not significant relative to the overall size of the capital investment for any of the three concepts and the range of uncertainty in the estimates;

  - transportation operating costs would be significantly less for Concept 2 than Concept 1 (about $2 billion per year difference) and Concept 3 would have an intermediate level.

In terms of capital costs, therefore, the similarity suggests that choices among the concepts (or hybrid versions of them) will focus more on the functional and qualitative aspects of the concepts than on their capital costs.

An Informed Debate

An informed debate on the most appropriate future urban structure for the Greater Toronto Area will focus, therefore, on the relative importance to the people and leaders of the metropolis of basic urban objectives:

- an efficient, pleasant and diverse urban ambience;

- continuing opportunities for and encouragement of economic growth;

- efficient, reliable, convenient and environmentally-benign transportation;

- cost-effective hard services;

- preservation and enjoyment of green areas and related water resources and achievement of sustainable development such that environmental quality is maintained or enhanced and natural resources conserved;

- effectiveness/efficiency of human services; and

- positive rather than negative impacts on the adjacent hinterland.

Debate regarding the relative importance of, and trade-offs among, the above types of objectives, in the context of information provided by this preliminary study, will, it is hoped, provide a sound basis for decisions on future directions for the GTA.

4.5 POSSIBLE NEXT STEPS

As stated earlier, the purpose of this study is to provide information and initial opinions regarding the infrastructure, cost and related qualitative implications of the three urban structure concepts studied. This is not a planning study, in that no recommendations are made regarding a preferred concept, and a conceptual level of detail and analysis is used.

It is hoped that the strategic information provided will provide a basis for productive discussion by those concerned with urban development/ infrastructure planning and delivery throughout the GTA and that, from this, a consensus will emerge regarding a preferred direction.

Hybrid Concepts

It is possible that a preferred urban structure concept may emerge from this process in terms of one of the three generic concepts analyzed in this study. It is also possible that many of those involved might identify a preference for combining certain attributes of one of the concepts with those of another, to produce one or more "hybrid" urban structure concepts. Investigation of such hybrid concepts was beyond the scope of this initial study, but identification and analysis of one or more such concepts may be a logical next step, following consideration and public discussion of results from the current study.

Quality/Cost Considerations

It was noted in Section 4.3 above that the substantial capital cost investment levels estimated in this study relate strongly to transportation improvements, both to address service level shortcomings accumulated during the past decade or more and also to accommodate the demand for new growth, at service levels equivalent to those provided in 1986. Significant, but substantially lower levels of investment were also included to maintain a range of passive open

space standards within the urbanized area under the three concepts and to improve the quality of storm water runoff, which is currently degrading recreational opportunities and environmental quality in the lakefront areas and river valleys of the GTA.

Again, decisions regarding investment levels relative to quality standards require careful consideration, and it is likely that more detailed study of these trade-offs will be required as a basis for such decisions. In the meantime, the strategic information provided by this study is intended to help inform the discussions and focus on-going actions regarding both issues: the preferred urban structure concept, and the level of investment those concerned with the future of the GTA are prepared to make to achieve desired functional and environmental standards.

Preliminary, for Discussion

This study breaks new ground by drawing together demand, supply, cost and effectiveness findings for three quite different future urban forms for the entire GTA including both "hard" and "soft" infrastructure. There is, therefore, little precedent against which to assess the results, some of which are perhaps unexpected or at least thought-provoking. The results are therefore preliminary, for discussion. If, as the findings are scrutinized and the comparison ratings are discussed, a consensus emerges regarding a preferred future urban structure for the GTA and/or a process for moving purposefully in that direction, the study will have served its purpose.